

# AUTOMOTIVE INDUSTRIES

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## The AUTOMOBILE

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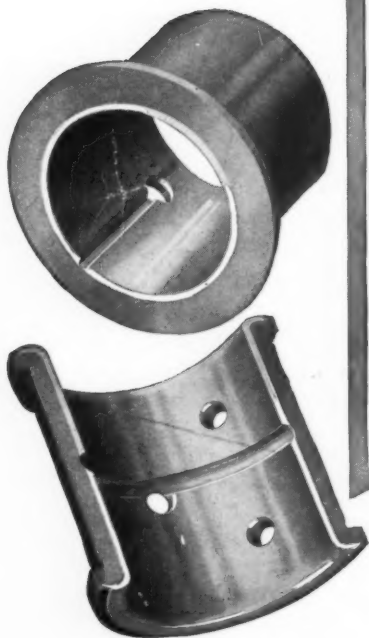
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# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

VOL. XLII

NEW YORK—THURSDAY, FEBRUARY 19, 1920

No. 8

## Difficulties Met in Selling the A. E. F. Cars

An amazing story of the condition and the disposition of the motor stocks of the American Army in France is revealed by Mr. Bradley. Thousands of machines cannot be traced and equipment spares are in a tangle. Theft and neglect have caused the loss of perhaps millions.

By W. F. Bradley\*

WHEN the American Army had finished its work in France, the homeward movement was hastened by the fact that the French Government undertook to purchase the whole of the immense stocks for the fighting forces. These stocks included everything necessary for an army and were the biggest military supplies ever gotten together in the history of the world. Their value is estimated at \$1,000,000,000.

Included in these stores were practically the whole of the automobiles, automobile supplies and reserve motor parks of the American forces. The French state that they received about 40,000 vehicles, made up of 20,000 trucks, 6000 light trucks, 6000 passenger cars, 2500 motorcycles and a later delivery of between 5000 and 6000 automobiles of various types. These figures are about 20,000 short of the vehicles shown on the inventories prepared by the American military officials before they sailed for the States.

Where these 20,000 vehicles went to, nobody knows. One French official with whom I spoke on this subject said: "We received approximately 40,000 vehi-

cles of all kinds, and no more. Yet, if the detailed lists of the American Armies are totalled, the figures run to more than 60,000. Where the balance went to, or whether the balance ever existed, is a mystery."

It is certain that at the close of the campaign the American Army had overseas not less than 60,000 vehicles. This was confirmed by Brig.-Gen. Walker, head of the Motor Transport Corps, soon after the armistice. Some of these vehicles, however, had moved up with the army into occupied Germany, and were disposed of there without passing through the hands of the French. It is impossible to believe, however, that this would account for 20,000 automobiles.

The sale was proposed to the French Government on the understanding that the whole or nothing should be taken. France was really in need of the food supplies, the engineering material, the building material and the railroad and road-making material. But many interests were opposed to the automobiles being left behind. The machines had to be taken, however, and when they were handed over nobody knew exactly how many were delivered.

\* Mr. Bradley is European representative and correspondent of Automotive Industries.

At the present moment there is not a person in France who can state exactly how many American Army automobiles are to be found in that country. The 40,000 mark is approximately correct. The truth may be a few thousands more or a few thousands less. Nobody knows and nobody cares.

The French authorities state they found in the American Army parks 6000 light trucks. Yet, if only the most important makes are considered, the American inventories show the following:

- 6000 Ford
- 3000 White
- 1800 Dodge
- 1428 Republic
- 300 G. M. C.

This gives 12,500 light trucks, without taking into account the 1200 Fiats bought in Europe and the various other makes, both European and American, purchased in small quantities.

A similar state of affairs exists for the passenger cars. The French statement of cars received is 6000. According to the American Army records there should have been left behind the following:

- 3000 Dodge
- 3000 Ford
- 1600 Cadillac
- 232 Winton
- 132 Studebaker
- 116 National
- 26 Packard
- 19 Locomobile

This gives over 8000 vehicles and no account is taken of 300 purchased from Italy, of about 200 bought second-hand when the shortage was great, and of the small number of other makes, among them being Premier, White, Marmon, Dorris, Pierce-Arrow and others.

The discrepancy between the number of trucks the French officials say they received and the number the American returns show to have been left behind is not very great. But when motorcycles are touched the two sets of figures are wide apart. On the lists there are:

- 10,000 Indians
- 9000 Harley-Davidsons
- 750 Imperials
- 600 Clevelands

In addition, some Reading Standards and various English makes were bought in small quantities. The French claim is that they received only 2500 motorcycles in all.

It must not be imagined that this is a complaint on the part of the French authorities that they have not received all they paid for. The official attitude seems to be that even the 40,000 were far too many to have to receive. These figures are merely put on record as exhibiting the looseness of the whole transaction. America did not seem to know how much she was leaving behind, and certainly France did not know how much she was buying.

Having taken over all this American automobile material, the question naturally arose as to its disposition. It should be remembered that the purchase was not popular. The French automobile industry did not hesitate to declare it scandalous that France should have to absorb the whole of the American Army automobile stocks. Officialdom, undoubtedly, was influenced by the

attitude of the leaders of the automobile industry. The French already had begun to dispose of their own surplus army automobile supplies, comprising at least 60,000 vehicles, and it was on this account that no American stocks were offered for sale before Oct. 1, 1919.

From that date until Jan. 1, 1920, there were sold 15,000 American Army automobiles and trucks. Evidently the demand was good when disposition could be made of 5000 automobiles a month. These sales were made, too, without any quantity of spare parts being offered with the automobiles.

At present the big stocks left behind by the Motor Transport Corps are intact. When repair parks are sold up the parts found there are sold with the cars, but these are altogether insufficient to meet requirements.

This means that there are 15,000 orphan cars in France, for American manufacturers have done nothing to meet the shortcomings of the French Government. The secretary of one of the biggest and most energetic automobile clubs in France, located in a prosperous farming district where automobiles are extensively used, writes as follows:

"Our members have bought large quantities of American automobiles and trucks, for one of the largest of the Motor Transport parks was in this district. They cannot get parts for these machines. The army seems to have nothing to sell and we have not been able to get in touch with the makers or their representatives. Can you tell us if the following firms have stocks of spare parts in France?"

Then followed a list of twelve well-known American firms, two of which had representatives in France but not one of which had any spare parts in stock.

One intelligent move was made when the French Government appointed Lieutenant Paris as Chief of the Sales Department of the army automobiles, and gave him a commission on the turnover. Lieutenant Paris, who has since become a civilian and has just resigned his position after friction with the military element, has sold 65,000 automobiles to the general public and has handed over to the treasury a total of \$100,000,000, in addition to \$40,000,000 for vehicles sold to the Ministry of Reconstruction.

So far as it was possible to do so, Paris organized the sales on commercial and not on military lines. He advertised well, he held sales in all parts of France, he gave the public an opportunity of examining the machines for sale and he offered facilities for securing spare parts for all French automobiles.

The central establishment is in Paris, on the Champ de Mars, where there is an open-air permanent display of army automobiles for sale and of spare parts necessary for these machines. Whenever sales are held, which happens every few days, a minimum price is fixed for each machine, and prospective purchasers are invited to make offers in writing. On the day appointed these offers are opened and the highest bidder gets the car or cars. There are exceptions. Certain persons are given priority tickets; among these are public bodies, people in the devastated areas, general transportation companies, etc. It is only after these priority bids have been satisfied that the general bids are considered.

Only a small proportion of the automobiles sold are in a condition immediately to take the road. It can be estimated, however, that 50 per cent can be driven away after repairs and adjustments, which can be carried out by any mechanic on the spot. The rest have either to be hauled away or carried on trucks.

At least 80 per cent of the purchases are made by dealers who put the automobiles and trucks into condition and then sell them to the general public. The



# Disposing of American and French Army Cars in France



*The main park in France where  
army automobiles and trucks are  
sold*



*The picture above gives a gen-  
eral idea of the condition of  
army trucks offered for sale in  
France. White and Fiat figure  
in this lot*



*The wrecks shown above  
and to the left are most-  
ly of French construc-  
tion. Both views, of  
course, were taken in  
army parks. Some of  
the machines were  
ruined in active service  
at the front*

rest are direct sales to users. It is impossible for the direct sales to be any higher.

When the American Army laid out its lines of supplies in France it was guided by military considerations exclusively. Convenience of access by the general public was an ignored factor. As an instance, M. T. C. Overhaul Park 719 is not much more than one hundred miles from Paris; it is by the side of a broad, straight, war-worn national highway, and there is a railroad station within a mile. But the civilian desirous of reaching it must spend six hours on the railroad, walk two miles and then plunge through seas of mud to get near the vehicles offered for sale.

The result is that there are practically no prospective purchasers of single trucks. The men found at Haus-simont, where Park 719 is located, are a small group of dealers and their mechanics out for bargains. Conditions are deplorable. To enter the camp at all it is necessary to wear trench boots. The buyers and mechanics working there are so equipped. The vehicles for sale are standing in the open and evidently have been standing there since the armistice.

When I visited this park only Nash Quads were present. The impression formed after an examination of as many of these as it was possible to reach without trench boots was that they had been more damaged by neglect than by use. The tires indicated that their mileage had not been great. Most of the makers' seals were intact. War service and the weather had removed all the paint and left the metal parts exposed to rust. Cylinders were cracked, most of the steering wheels were broken or had gone; few of the radiators would hold water, and easily removable parts, such as lamps, plugs, valve caps, greasers, fire extinguishers, etc., had disappeared.

A minimum price had been put on each machine. It varied from 2000 frs. (\$400) to 6000 frs. (\$1200) and averaged about \$550. Probably few would be sold at the minimum but, in view of the small number of persons who could reach the park and the neglected condition of the trucks, the selling prices would be low.

Verneuil is within 150 miles of Paris but by railroad it cannot be reached in less than eight hours; no accommodation of any kind can be obtained in the village of Verneuil, which consists of about a score of houses, and any person starting there from Paris to inspect vehicles must be prepared to spend two to three days on the job. Bourg, where the greatest number of American Army automobiles are now parked, is equally inaccessible. The express train will take the visitor within five miles of the place in about five hours, but the last portion of the journey may occupy two or three hours.

Owing to lack of personnel, it has been impossible to unite these vehicles in good buying centers. The American forces left them in their own parks, most inaccessible to the general public and generally far from any great commercial center, and the French Government, not having any surplus labor, had to leave them where they were abandoned.

**The consequence is that they can only be sold to speculators and realize less than their actual value.**

So far as French automobiles are concerned spare parts have been put on sale simultaneously with the vehicles. The French had an important, although not an excessive stock of spare parts. Further, dealing with well-known makes, mechanics did not hesitate to purchase vehicles in order to pull them to pieces to get the spare parts. In consequence, there never has been any serious spares problem connected with the French

vehicles and purchasers have not been held back by the fear that they would not get supplies.

When the American Army automobiles are considered, the situation is entirely different. Few American spare parts have been sold, although 15,000 American Army automobiles have been put into the hands of the public. There is no shortage of spare parts. When the Motor Transport Corps went home it left behind spare parts sufficient to feed the army on a war basis for 18 months. At the present moment there are in France 200,000 boxes of American automobile spare parts which never have been opened. The huge M. T. C. Reconstruction Park at Verneuil, which has miles of lockers of spare parts, has been left intact.

**Whether this is carelessness, or whether it is a well-designed attempt to make orphans of the American Army automobiles in France, it is not proposed to state. The outcome is that, unable to get supplies, the client offers a lower price than he would in normal cases, or he does not purchase at all, and the reputation of American automobiles is being lowered.**

On the whole, American manufacturers have taken no interest in this problem, or, if they have been interested, they have not shown it in a practical manner. Probably they realize that thousands of tons of spares were sent to France and they do not imagine there is any market to be filled. It must be remembered, too, that with the exception of Ford, no American maker sold any quantity of cars in France or kept any stock of spare parts in France before the war.

Pierce-Arrow has direct factory representation in France but not many spare parts for sale. A contract between the Pierce-Arrow company and the French Government stipulated that the former should have the option of purchasing all their parts at the end of the war at 40 per cent off list prices. The French Government contends that this does not apply to stocks taken over from the American forces. The Pierce-Arrow people do not share this view and has served an injunction on the French Government. It the meantime the parts, of unknown quantity and value, are tied up and cannot be secured by anybody.

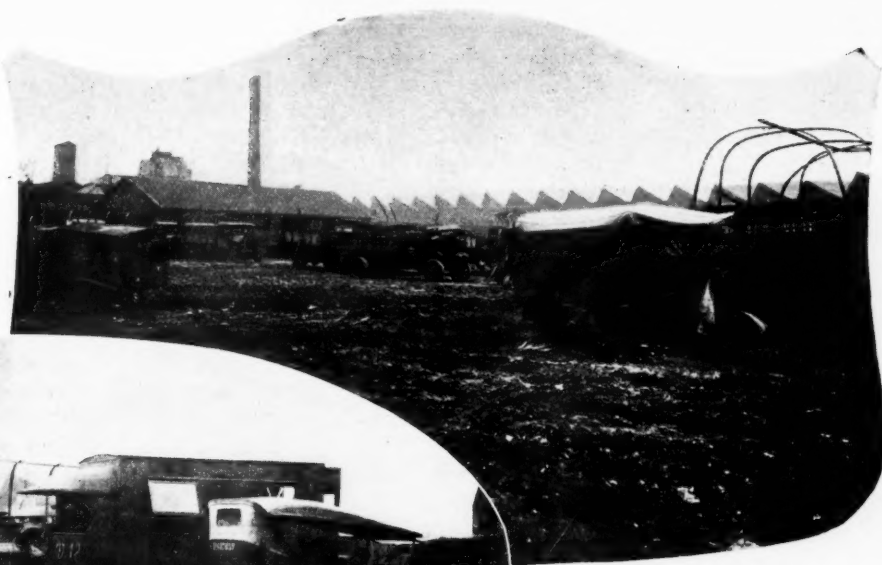
Packard has a good service station in Paris and adequate parts for users of Packard touring cars. But the stock bins are empty of Packard truck parts. It is declared that the French authorities offered to sell back to the Packard company all the Packard parts left behind by the American Army. The price was not known; the quantities were unknown and no inventories existed. Packard could go to Verneuil, dig out their spare parts from the thousands of cases lying there, and make an offer.

This proposition was declined. The Army method of ordering spare parts was on the basis of complete units. For every set of piston rings there is a corresponding set of cylinders and there are just as many driving chains as there are complete gear boxes. Commercially, the stocks are lop-sided, and according to the Packard people, if purchased, would tie up a lot of capital needlessly.

Dodge has just made arrangements to cover the whole of the French territory, but N. S. Goodsill, who has taken charge of the organization, would be embarrassed if called upon to make immediate delivery of half a dozen Dodge cylinder blocks or two or three gear boxes. This is not because such parts do not exist in France, but because they are tied up in the military parks and cannot be obtained. There are supposed to be 5600 Nash Quads in France, but there is not a single indi-



# American Army Automobiles Sold to France



*A desolate camp where American army cars are parked for sale to the public*



*Neglected and abandoned Cadillac touring cars in one of the former American parks*



*The view above shows American army trucks and wrecks assembled for sale near Paris. American passenger cars and ambulances awaiting sale are seen to the left*



*The picture to the right is a typical view of the condition of the majority of American army parks in France*



vidual who is in a position to supply the public with Nash parts.

General Motors officials recently spent two months in France but when they returned home nothing very definite had been done to supply parts or to give service to future purchasers of their vehicles. Cadillac, it is true, is well represented, but it is not to be expected that Tomine will share his limited stock of spares with purchasers of army stocks. The American Army lists show 5240 G. M. C. trucks but a vigorous search does not reveal one G. M. C. service depot. The American Army left several hundred Whites behind and the French forces sold out several thousands but there are no White parts to be had.

At Verneuil there are thousands of solid rubber and pneumatic tires. The former spent two winters in the open air and have not been improved. The latter have been kept under cover until they have become stale. Few American tires have been offered for sale. The doors of the warehouses at Verneuil are locked and no tires can be taken out.

No American automobiles came to France with metric size tires. Thus, when a person purchases a Dodge or a Cadillac, he frequently has to convert the wheels to take European size tires while American tires made to fit his car are rotting.

The officials connected with the sale of army stocks recognize that the system is defective. As the French Government cannot undertake to run spare parts and service depots for American firms, it was suggested that the whole of these spare parts should be sold to the representatives of American firms in France. For instance all the Cadillac parts should be offered to Tomine, the Cadillac representative in France. Dodge parts should be sold to the factory representatives appointed in the five important centers of France. The Pierce-Arrow company should be asked to take over all their parts, and so on.

This scheme was proposed to the Ministry but nothing definite has been done. The Ford people in France knew that there were \$10,000,000 worth of spare parts lying at Reconstruction Park No. 1, Verneuil. Manager Griffin was anxious to purchase them, and after long negotiations was given permission to send an expert to make an examination. The Ford expert reported that he found hundreds of boxes that had never been opened. They were standing outside and were piled as high as the second floor of an ordinary building. He had between 40 and 50 of these boxes opened, but in every case he found them so damaged and so badly rusted that they would not pay for the labor necessary to clean and repair them. Parts worth \$10,000,000 had been lost through neglect.

Ford was still interested and asked to be given a complete inventory of all Ford parts in storage in France, when an offer would be made for their purchase. No such list could be obtained, for nobody knows what stocks exist.

This is not the only incident in connection with Ford. When the war ended there remained 1200 cars out of the last contract of 8500 to be assembled for the French Army. The order was cancelled but Ford was not allowed to take delivery of the parts for these 1200 cars. This was army material and could not be purchased by Ford for disposal to other parties until a decision had been reached. More than a year has passed and still the decision is being awaited. In the meantime, soldiers who have since become civilians were left in control of the 1200 Fords awaiting assembly as Bordeaux. They have nothing to control, for Ford's contract with

the French Army has been cancelled, but they remain doing nothing but occupying valuable desk room.

Even if the army decided after all to take delivery of these parts, it could not assemble 1200 cars out of them, for one ship with many of the components aboard was torpedoed on its way to France, and other boxes were sent to the wrong port and have never been discovered.

The Dodge people were in a dense fog: "We know the American Army left hundreds of tons of Dodge parts behind. We are willing to consider their purchase for retail sale in France, but we cannot find anybody who can give us information on these parts or where and how they can be bought."

France is full of stories of automobile disorganization, waste and robbery. The men directly responsible for the sale of army cars are not the ones responsible. Lieutenant Paris was given the job of selling 100,000 automobiles but he did not have a staff exceeding 350 employees for the whole of France. The turnover ran as high as \$12,000,000 a month and a staff of 350 did this big business.

The waste is due primarily to the lack of staff and to the absence of skilled personnel. The automobile service of the French Army was composed almost exclusively of older officers and men. They were among the first to be demobilized and for a time their places were taken by younger men without any special automobile knowledge. Now these have been returned to civil life and the automobile service as it was known during the war has practically ceased to exist. But the vehicles remain; automobile material to the value of probably \$400,000,000 has been left behind and put in the hands of a few unskilled men or, in most cases, has been left in the hands of nobody at all.

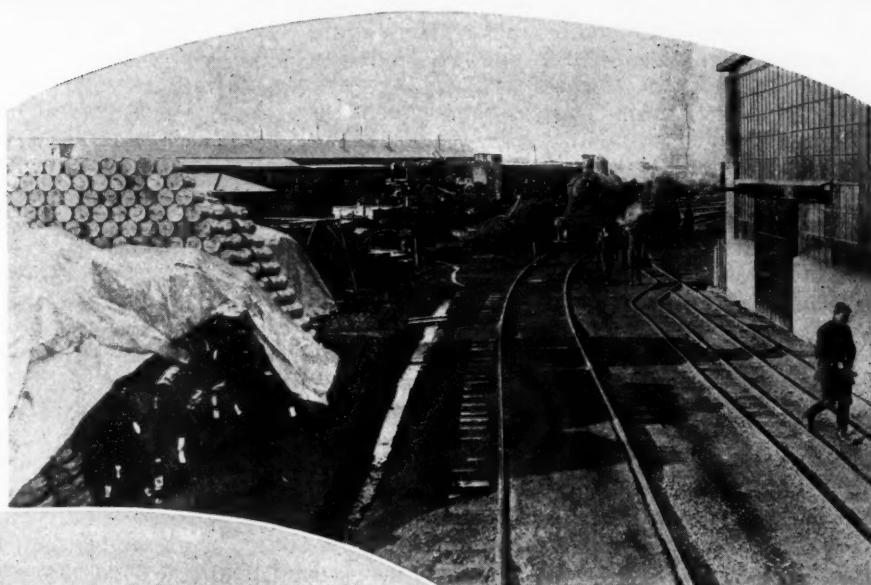
Three different organizations are responsible for this material. The military authorities act as guardians, selecting the ground and forming the parks. The Liquidation Board has to determine the value of the material and put it up for sale. The Financial Department has to cash in. The military authorities have no notion of the value of the material in their hands and they have no staffs to handle or protect that material. In most cases the automobile parks are war dumps heaps, where trucks and motorcycles, passenger cars and bicycles are heaped together. When a sale is decided on, a few good vehicles are thrown in with the wrecks. There is no order, no system. A car in good running condition may be piled up with a mass of junk it would be expensive to cart away. In many cases it is impossible to get the vehicles away at all without considerable difficulty, for rarely has the ground been prepared and, after the wet winter common in France, even a Holt tractor has difficulty in pulling a truck out of the bog.

There being little organization and no guardianship, a horde of thieves has been attracted to these stocks. Every known kind of theft and every dishonest method imagined since the world began has been brought to bear to bespoil the State of some portion of the property put in its charge. From the hold-up gang to the soldier who slips brass grease cups in his pocket, they are all on the job.

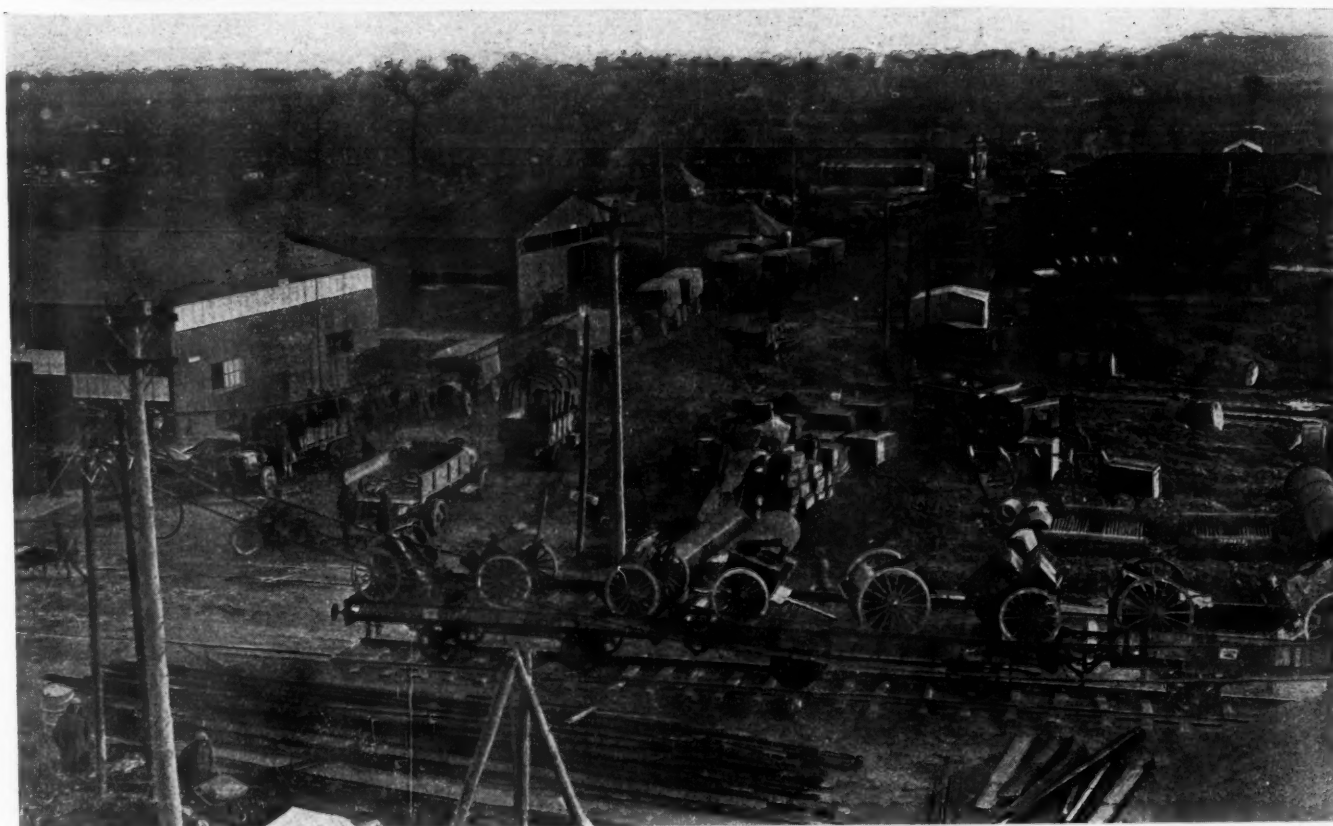
And they are not all French. A certain number of men got their discharge from the American Army while in France or quit the army without waiting for an official discharge and, because of their special knowledge of the American depots and their acquaintance with American cars, they have proved themselves the most successful members of the thieving gangs.



# The American Motor Transport Corps Park at Verneuil, France



*Automobile parts standing in the open at Verneuil. Many of these have been left untouched for nearly two years. Piles of tires are shown on the left*



*A bird's eye view of the Verneuil park, the chief motor center of the A. E. F. The photographs on this page bore the censor mark of the American Army*

During the past year five French sentinels have been shot dead while guarding automobile stocks. Here again the authorities are to blame. Three men in American uniform entered the park at Verneuil. They carefully selected a Cadillac in running order, then proceeded to the offices and loaded up with typewriters. When about to pass out of the gates, the thieves levelled their revolvers at the sentinels, who dropped their rifles and let the car go by. Cowards or accomplices? Neither. Somebody in authority had decided that accidents occur easily and had given instructions that no cartridges should be issued to the sentinels. The thieves knew this.

A truck drove up to the gates of the American park at St. Denis, near Paris, and the men aboard fired their revolvers. Sergeant Randolph, Quartermaster Corps, continued to read his paper over the fire in his office, and the truck drove in, was loaded up with gasoline and came out again unmolested. In this way 12,000 gallons of gasoline were secured—gasoline is retailing at Paris at \$1.20 a gallon.

Police inspectors were informed of this system and hid themselves just inside the entrance to the grounds. When the truck came along and the fancy shooting began, nobody stirred, as usual, but when the load of gasoline was about to pass out, the inspectors' revolvers came into action. The two Frenchmen on the truck, as well as Sergeant Randolph, were arrested and immediately denounced the entire gang. Among them was a garage proprietor at Suresnes who stored the gasoline.

At Camp No. 7, at Saint-Nazaire, Léon Blanc, Chief of the Sales Department, has been arrested after 200 American automobiles had disappeared. Lieut. Jules Labitte has also been arrested in connection with the same affair, but the charges against him have not been made public.

At Nanterre, where the French Air Service supply and reconstruction park is located—it is the largest park of its kind in the world—the Chief of Building Construction has been arrested and condemned for wholesale robbery of automobiles and supplies. He admitted the charges against him, claiming that he had a right to do what everybody else was doing. At Nanterre the main buildings are of stone, but there are scores of acres covered with wood and canvas tents and in these valuable material is housed. Under cover of darkness petty thieves slipped under the canvas and disappeared with magnetos, carbureters, instruments, tires, wheels, etc. There was no risk, for the soldiers in charge never left the wood shed near the main entrance.

At the well organized camps, magnetos and carbureters are removed and placed in storage. At the others—the great majority—these essential accessories, to-

gether with such trifles as grease cups, valve caps, pressure gages, speedometers, hub caps, tools, are taken away by enterprising individuals.

That is not all. Many of the buyers, who are allowed to wander about the grounds, have forgotten the ten commandments and, if in need of a particular cylinder block, a rear axle, wheels or wheel bearings, they take them. There is nothing suspicious in a mechanic removing a cylinder casting in broad daylight and the sight of four exposed pistons does not attract any attention. As to its removal, there is no difficulty in placing it aboard a truck that has been bought and paid for. The most unfortunate feature of the situation is that somebody may have bid for a complete vehicle, his offer may have been accepted and, as no articles are guaranteed, he is inclined to be angry on taking delivery to find that his purchase is minus an engine or a rear axle. This happened at Rheims to several buyers of army stocks.

Disposing of stolen automobiles is easy. In all the important centers of France and particularly around Paris, there are scores of mechanics, recently established in business, many of whom are not adverse to purchasing at a low price such automobiles as may be offered. They carry out the necessary repairs, mix up the parts if necessary and then offer them for sale. In order to make it difficult to sell stolen automobiles, an official certificate is given with every machine sold by the army and the police refuse to grant a registration license unless this certificate is presented.

This, however, does not interfere with the disposal of trucks, for being incapable of attaining a speed of more than 18 miles an hour these vehicles do not require a registration license. Even in the case of a touring car, the difficulty is not insurmountable. An American mechanic who was met in a Paris bar explained the operation by saying:

"I have a Packard which came from nobody knows where. Before it can be put on the road it must have a police registration number and a 'gray card.' If I apply for these the police will want to know where the car came from and if import duty has been paid on it. That's easy. I just go down to Clichy depot and I buy a Packard wreck. This is described as a car and a certificate is given with it stating that all French regulations have been complied with. I take the motor and chassis numbers off the wreck and put them on the stolen car. Then I go to the police and ask for a registration number. If anybody makes any remark about the low price paid for the machine, I have only to show a receipted repair bill for ten thousand francs. In certain quarters you can get all the receipted bills you want for a louis."

## Altitude Effect of Air Speed Indicators

THE investigation on the effects of altitude on air speed indicators, carried on at the Bureau of Standards, is nearing completion. The water channel and vacuum wind tunnel experiments may be interpreted as showing conclusively (1) that the compressibility of the air may legitimately be left out of account in determining the law of action of the usual Venturi tubes; (2) that viscosity must not be neglected in low speed flights, thus introducing a new property of the atmosphere hitherto ignored; (3) that at low speeds the indication of the Venturi, contrary to the assumption hitherto made by all users of this type of indicator, is not directly proportional to the air density, nor is it proportional to the square of the speed, but departs noticeably from this relation.

Through the courtesy of the Air Service, the Bureau's expert on the above subject has conducted flight tests at McCook Field which have afforded a practical check against the numerical results of the previous laboratory experiments. As soon as these results can be made available, they will be of importance in connection with airplane performance tests whenever high precision is required, and more particularly in connection with air speed observations on dirigibles.

THE Bureau of Labor Statistics issues a summary stating that union wage scales in general trades of 1919 average 17 per cent higher than in 1918, 55 per cent higher than in 1913, and 72 per cent higher than in 1907.



# Studebaker Selects Lighter Six for Large Production

A demountable aluminum head, with the intake cast integral, is the novel feature of the L-head engine. The new Studebaker factory has been designed solely for the manufacture of this car, starting some time in March.

By J. E. Schipper

**A** NEW six-cylinder Studebaker has been brought out, smaller than the other sixes, that will be the big production work of the Studebaker Corp. It will be made completely at South Bend, Ind., in a new plant designed for its manufacture. Production will commence probably in March.

The car, which has a 112-in. wheelbase, will be made at first with a five-passenger touring body and with other bodies later. It is fitted with an L-head, enclosed valve type of six-cylinder engine, with the cylinders and crankcase cast en bloc, and with a demountable aluminum head. The engine is rated at from 35 to 40 b. hp., having cylinder dimensions of  $3\frac{1}{8} \times 4\frac{1}{2}$  in. The use of the aluminum casting for an L-head engine is novel, and particularly the practice of casting the intake integral with the head, which gives a gas flow across the cylinders to the valves on the opposite side from the carbureter. The intake manifold, which is horizontal, joins to a vertical flange carbureter, thus providing a straight passage for the gases across the combustion chamber to the intake valves. The combustion chambers, located in the cylinder-head casting, can be machined by a combination slab milling and profiling operation.

A long water jacket, rendered possible by casting the cylinder block and upper part of the crankcase integral, is a feature of the engine. The lower part of the crankcase is made up by the stamping containing the oil splash troughs. Three-ring pistons are used, with all the rings above the wrist-pin. A feature of the piston is the use of oil grooves with drain holes below the lowest ring. Two of these holes are drilled through the piston pin bosses and go to the wrist-pin bushings. The wrist-pin is rigidly clamped in the upper end of the connecting rod and has its bearings in the piston bosses.

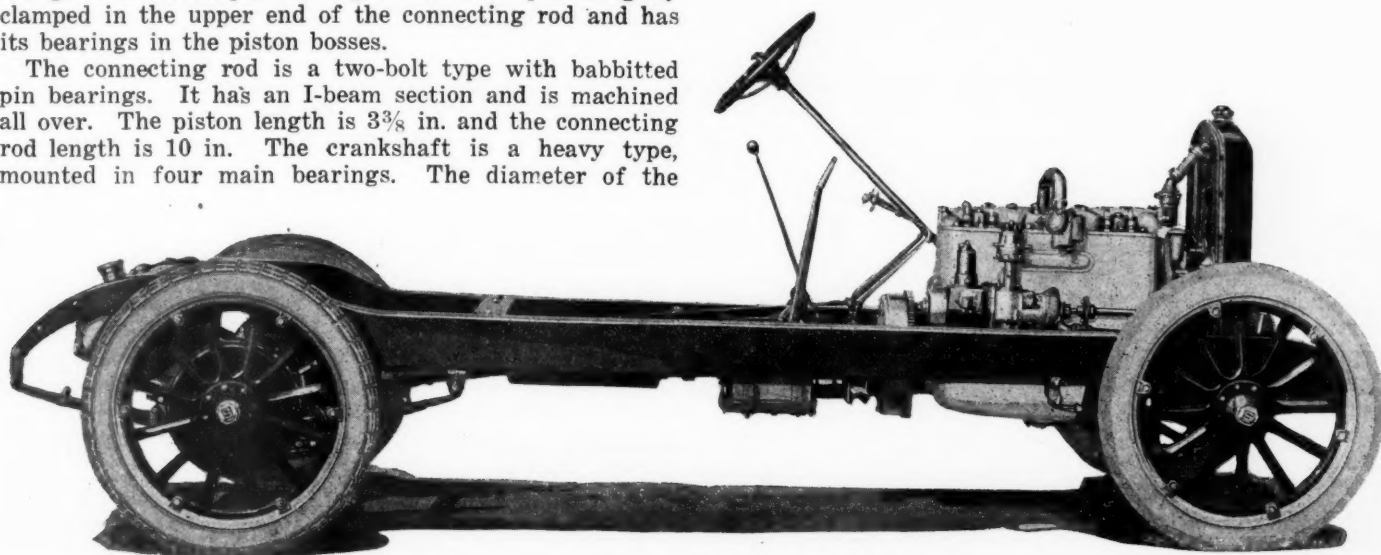
The connecting rod is a two-bolt type with babbitted pin bearings. It has an I-beam section and is machined all over. The piston length is  $3\frac{3}{4}$  in. and the connecting rod length is 10 in. The crankshaft is a heavy type, mounted in four main bearings. The diameter of the

crankshaft is 2 in. at the pins, the main bearing diameters varying from 2 in. at the front, in steps of  $\frac{1}{32}$  in., to  $2\frac{1}{16}$  in. at the rear. The bearing lengths are  $2\frac{3}{4}$  in. for the front,  $1\frac{5}{8}$  in. for the two center bearings and  $2\frac{3}{4}$  in. for the rear. The connecting rod and piston assembly weighs 3 lb. 2 oz.

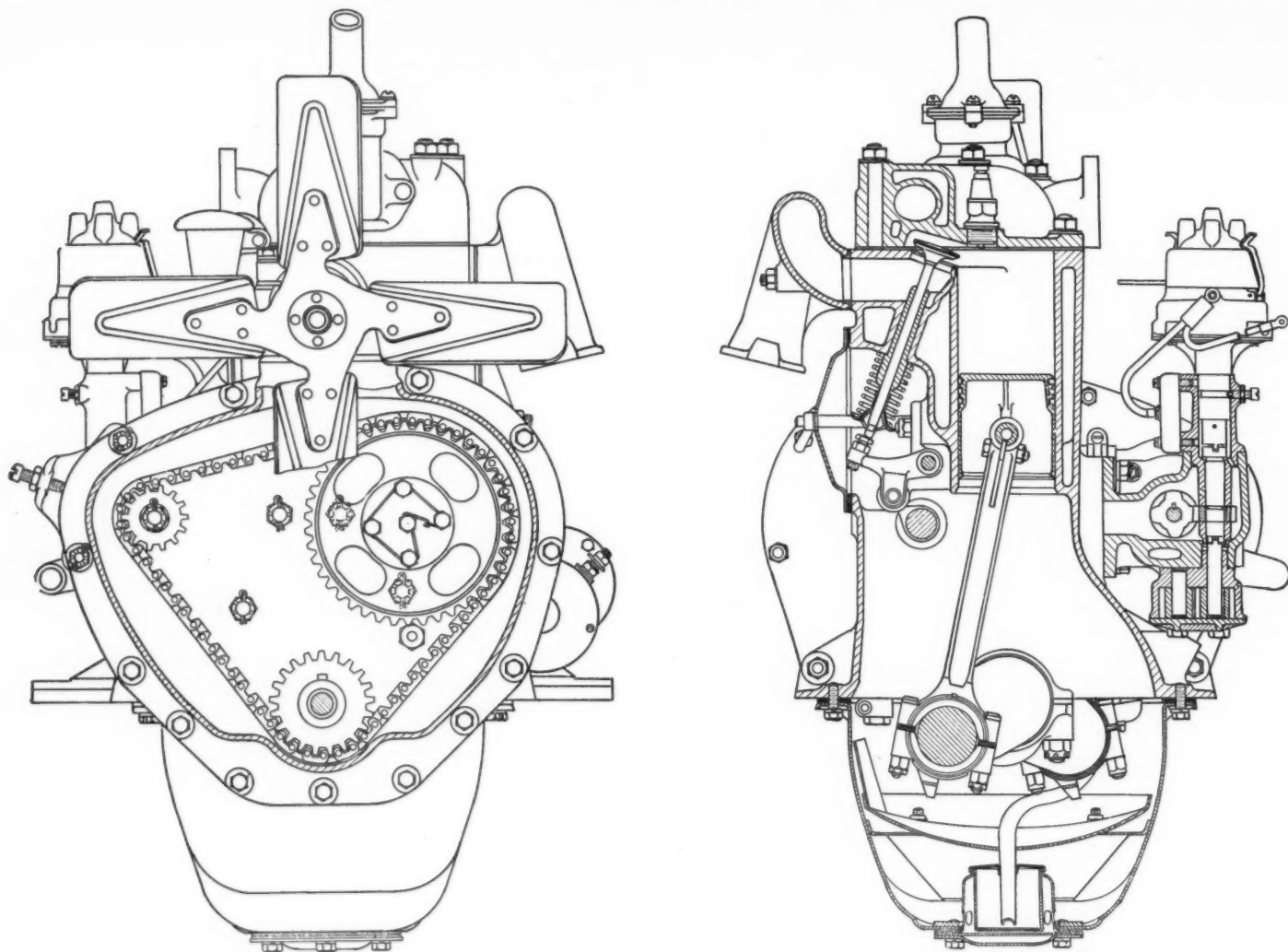
A triangular drive by Morse silent chain is provided for the camshaft and accessory shaft. The chain passes around the crankshaft, camshaft and accessory shaft sprockets and is adjustable by means of a grooved retainer for the accessory shaft sprocket. To take care of the changes of alignment due to adjustments on this sprocket, there is inserted a universal shaft with two flexible disk couplings between the sprocket and the pump, and other accessories that it drives. The camshaft is on the left and the accessory shaft is on the right. There are no accessories on the left, except the starting motor, thus making the valve cover plates readily removable.

In driving the valves, bell cranks are used, with a roller follower on the short arm and an adjusting screw on the long arm in contact with the valve stem. There is a considerable inclination to the valve, the angle being 20 deg. to the vertical. The objects aimed at are to secure a better form of combustion chamber, to render the valves more accessible and to insure easy gas flow.

Lubrication is by splash and pressure, the same as in other Studebaker models. The oil is pumped by a gear pump driven off the accessory shaft by spiral gears. The pump acts at the center of the oil pan, taking the oil through a cylindrical strainer and delivering it through a horizontal distributor pipe to the camshaft bearing, and



Side view of the new Studebaker light six chassis



*Sectional view of the new Studebaker six engine, showing at the left the Morse triangular silent chain drive for the camshaft and at the right the valve arrangement*

by radial holes through these bearings directly to the main bearing oil pockets. Locating the pump at the center is for the purpose of preventing it losing prime on grades. In addition to the camshaft and main bearing leads, the distributor pipe has leads to the connecting rod troughs. The oil filler is cast integral with the fan bracket, making it exceptionally accessible.

Cooling is by centrifugal pump, the water entering the cylinders at the right side near the center, and flowing uniformly up around the valve ports into the head and back to the radiator through a thermostatic device set to open at 130 deg. A tubular type of radiator is employed for strength. Cooling is assisted by a four-blade fan, which is driven from a pulley on the accessory shaft. Adjustment of the fan is taken care of by an eccentric and a clamp screw on the bracket. The fan shaft is lubricated by splash from the chain drive.

The car is equipped with a Wagner starting and lighting and a Remy ignition system. The starting motor connection is by means of a Bendix gear. A three-plate dry type clutch is used, the driven member being a single disk between two rings of friction material. A clutch brake is incorporated in this unit, the throwout collar, being allowed to press against the hub of the driven disk, with a brake lining disk between the two surfaces. There is a flexible coupling between the engine and gearset, this being a single disk fabric type on a splined shaft. It takes care of any possible misalignment between the crankshaft and transmission shaft. In accordance with the

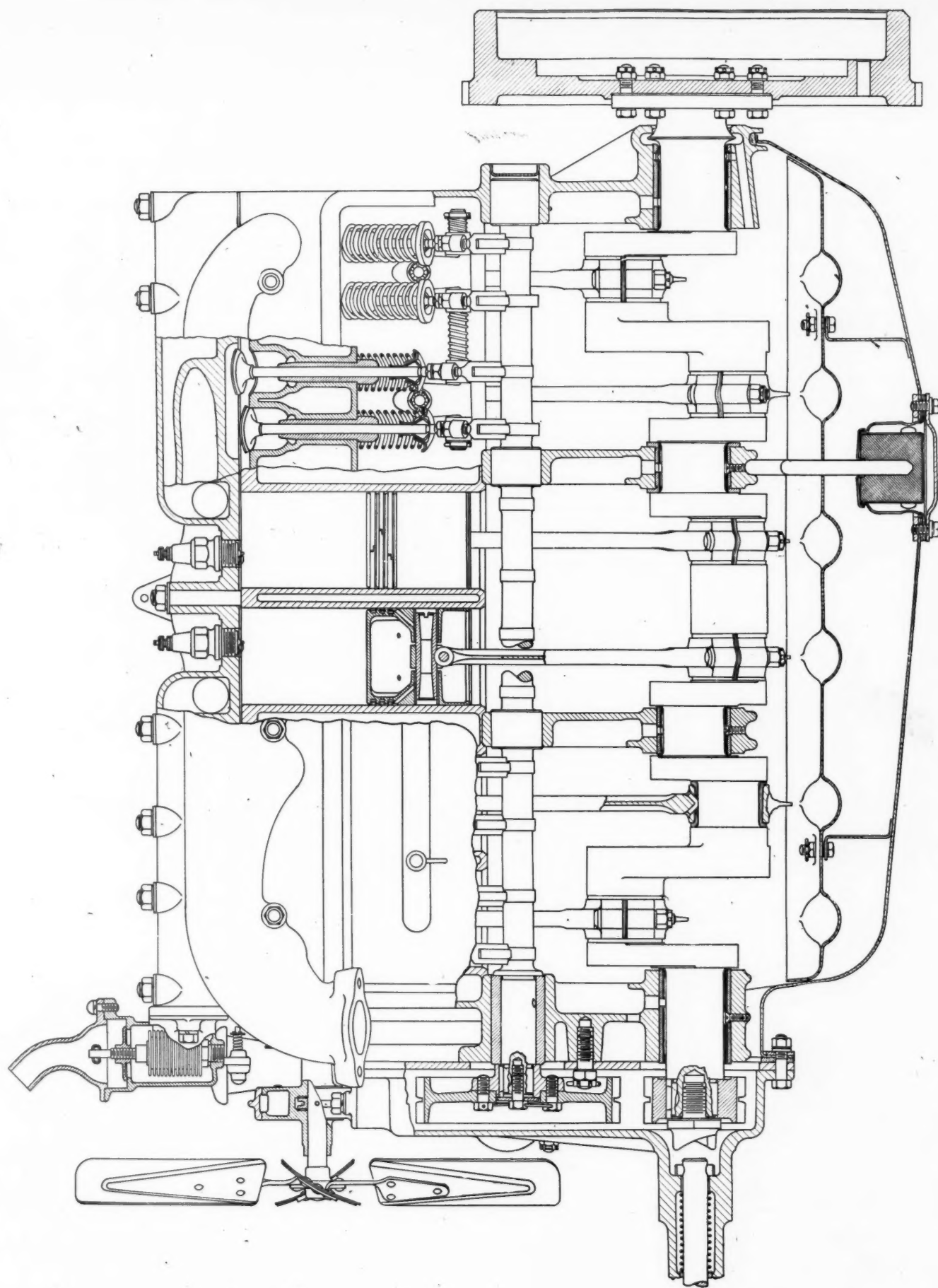
usual Studebaker practice, the gearset is mounted amidships and has a three-point suspension, the mounting being on an extension of the sub-frame forming the engine support. The case is of aluminum and the main shaft bearings are Timken rollers. The countershaft gears are cut from an integral forging, the gears being bronze bushed and rotating on a fixed shaft. The gear teeth have a 20 deg. pressure angle.

The propeller shaft is set to have a 4 degree, normal angle. It incorporates two flexible, three-disk joints with three-armed spiders. The rear axle is semi-floating, with spiral bevel gears and Timken bearings. The gear carrier comprising the pinion and differential bearings is a self-contained unit and can be removed without taking the axle from the car. A reduction of 4.55 to 1 is obtained in the rear axle. This is in connection with 1 to 1, 1 to 2 and 1 to 3 reduction gears in the box. The final drive is of the Hotchkiss type.

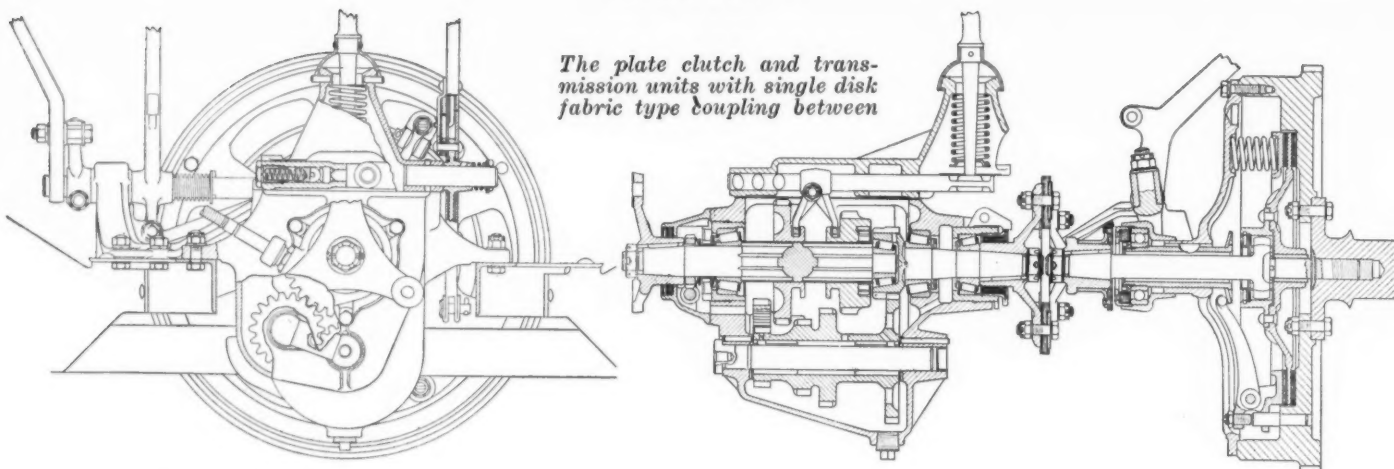
The usual Studebaker practice is followed in the front axle, the knuckle pins being fast in the knuckle. To insure easy steering, the knuckle pins are located close to the center plane of the wheel. The steering tie rods are made with ball and socket joints similar to those in the drag link. Front and rear springs are both semi-elliptic, bronze bushed. The rear springs are provided with flanged bushings machined to width, to eliminate side play.

A straight line frame is used, with five cross-members. The first or forward cross-member supports the radiator





Longitudinal section through the Studebaker light six engine. The engine is rated at 35-40 horsepower, with cylinder dimensions of  $3\frac{1}{8} \times 4\frac{1}{2}$

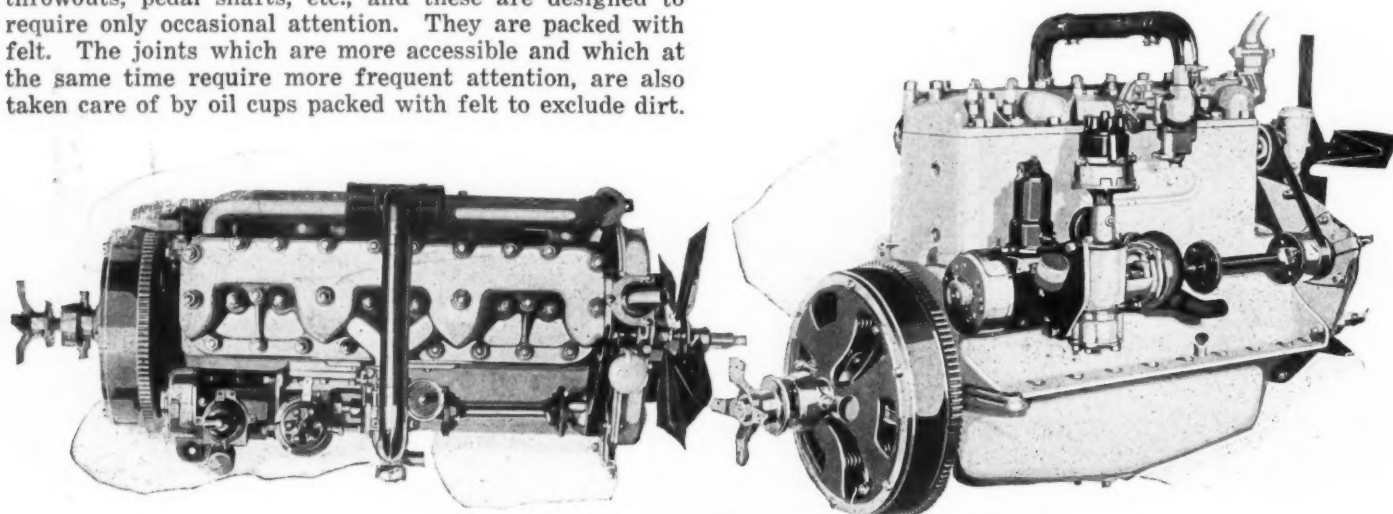


and the front engine trunnion mounting. The second and third cross-members carry the rear of the engine and the gearset, which are on sub-frames riveted to these cross-members. The fourth cross-member carries the brake cross-shaft, and the fifth, at the rear, fits around the fuel tank and helps to support it, besides acting as a tie-bar for the frame. The frame is 6 in. deep and of  $\frac{1}{8}$ -in. pressed steel.

Chassis lubrication is exclusively by oil, cups being located on the brake cross-shafts, rear axle brackets, clutch throwouts, pedal shafts, etc., and these are designed to require only occasional attention. They are packed with felt. The joints which are more accessible and which at the same time require more frequent attention, are also taken care of by oil cups packed with felt to exclude dirt.

These joints, such as steering knuckle pins, etc., have cups which are readily reached by an ordinary oil can.

The wheels are wood and carry 32 x 4 in. cord tires. The body is a straight line type with deep sloping cushions and fitted with a top having side curtains that open with the doors. The wheels are derby red, striped with black, and the instrument board is mahogany with ignition and lighting switch, ammeter, oil gage, speedometer, fuse box, etc., mounted upon it. The price has not been fixed and will not be announced for some time.



*The Studebaker light six engine, top and right side views*

## Industrial Safety Codes

A CONFERENCE on industrial safety codes, at which there were representatives of practically all organizations of a national scope interested in industrial safety, has been held at the Bureau of Standards, Washington. After a thorough discussion of the situation, the consensus was that a large number of industrial safety codes—perhaps 50, or even 100—should be developed during the next few years.

The conference voted that the preparation of all such safety codes should be under the auspices and rules of procedure of the American Engineering Standards Committee. In accordance with the recommendation of the conference, the American Engineering Standards Committee requested the International Association of Industrial

Accidents Board and Commissions, the Bureau of Standards, and the National Safety Council to organize a Joint Committee on Safety Codes, this committee to include representatives of these bodies and such others as they may consider advisable, with the understanding that the joint committee shall report upon safety codes required, priority of consideration of the codes, and sponsor bodies for their consideration.

In compliance with this request of the Standards Committee, the three bodies have organized such a committee, composed of officials of the National Safety Council, State Labor Industrial or Safety Commissions, etc. The first meeting has been held at Washington, when tentative recommendations were formulated for some thirty codes.



# Britain Demands Light Two and Four-Passenger Small Engine Cars

Although of old standing on the Continent, the after-war revival of this type of machine—which is much larger than the old cyclecar—surprises Mr. Bourdon and he predicts that fifty per cent of the British passenger cars soon will be of such manufacture. Prices range from \$700 to \$2400.

By M. W. Bourdon

WITH approximately 40 firms, small and large, specializing upon its production, a dozen others making it one of their models, and one weekly journal (two until 1918) devoted entirely to the interests of its users, the light car may be said to be a power in British motordom. In its larger forms its popularity is becoming even more pronounced and the time is not far distant when fifty per cent of the four-wheeled motor vehicles on English roads will be light cars.

The extent of this movement toward the use of tiny two-passenger and four-passenger cars is, perhaps, not realized in the United States, and the reasons for the popularity of the type may not be apparent to American automobile engineers.

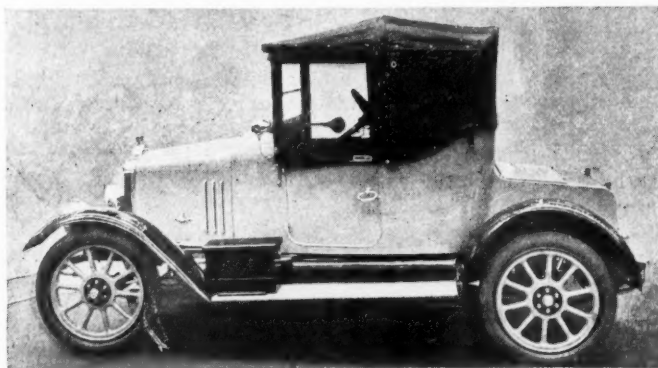
While the first demand of any magnitude for light cars and an endeavor to meet that demand commenced in 1912, the single cylinder  $3\frac{1}{2}$  hp.,  $4\frac{1}{2}$  hp. and 6 hp. De Dions and

the 6 hp. Rovers, among other makes, in their time (1900-1907) were popular as a type of two-passenger machine that provided reliable service and could be operated at a low cost. But they were noisy, their engines gave rise to

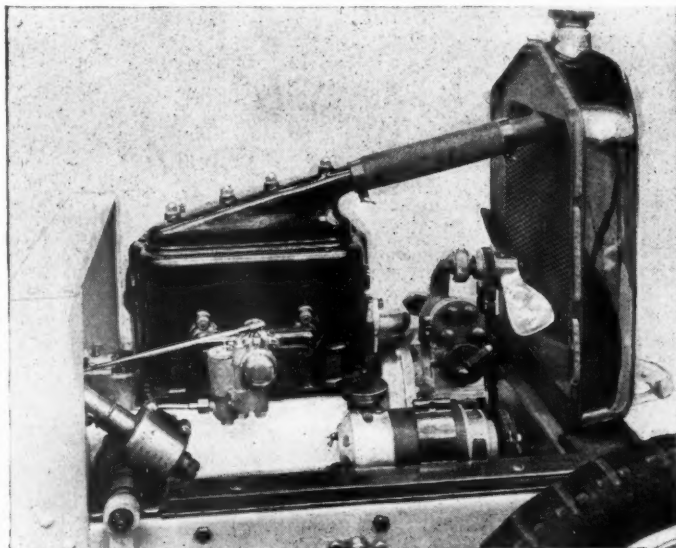
excessive vibration and they were discarded by their makers, who, becoming more ambitious, superseded them by manufacturing larger, heavier and more costly cars.

But in 1912 or thereabouts a campaign commenced in newspaper circles with a view to encouraging "economical motoring" and the production of a type of car that should appeal to the man with a short purse. In response numerous small and mostly unknown firms hurriedly designed and put on the market light two-passenger and even one-passenger machines with air-

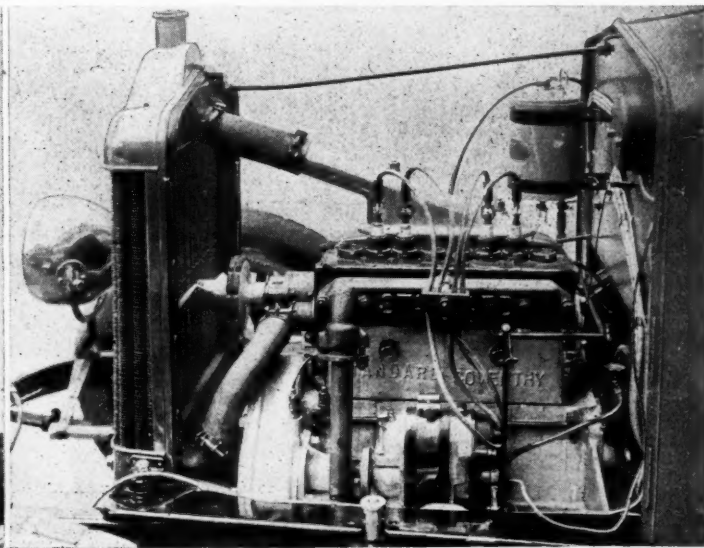
cooled one or two cylinder engines. The chassis was built on motorcycle lines, with final drive from a countershaft



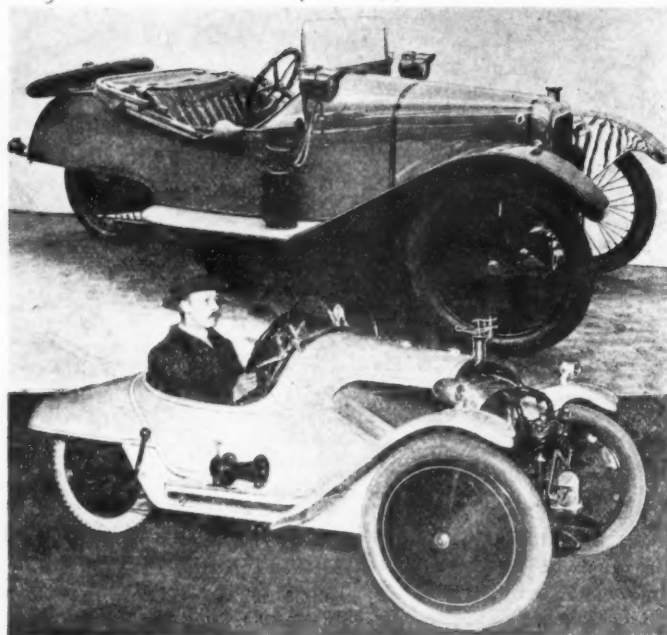
Standard 9.5-hp. car, with folding top and transparent panels that open with doors. Wheelbase, 92 in.; track, 48 in.; piston displacement, 81 cu. in.; weight 1550 lb.



Briton 10-hp. light car engine with block cast cylinders on aluminum crankcase. Piston displacement 83 cu. in.



Valve side of the 9.5-hp. Standard engine. The cylinder dimensions are 62 x 110 mm. (approximately 2.4 x 4.3 in.)



Above—Premier runabout  
Below—Morgan water-cooled model

by means of two motorcycle belts. Expanding pulleys to provide a variation of ratio frequently were fitted on the ends of the countershaft and belt rims were secured to the spokes of the rear wheels. No differential was fitted, the ends of the solid stationary rear axle carrying the wire-spoked road wheels on ball-bearings of the cup and cone type.

#### First Cyclecar Type Unsatisfactory

Taken as a whole these machines were extremely unsatisfactory. In many cases they were unsprung, and the trumpy nature of their fittings, bodywork and steering gear (the latter often consisting of a cable encircling two or three bobbins) enabled road vibration rapidly to shake them to pieces. While the craze lasted they sold at prices varying from \$250 to \$600 and weighed from 450 to 800 lb.

Realizing the demand for light two-passenger cars, certain well-known firms, among them the Singer and Standard companies, set their designers at work to produce a small four-cylinder water-cooled, all-gear driven chassis of good quality and capable of standing up to normal service in Great Britain. Several other makers followed and, by the beginning of 1914, such machines had secured a firm hold in the public estimation. The term "cyclecar," which had been adopted for their forerunners, was dropped and they were universally known as "light cars." The ruling body in matters pertaining to motoring in Great Britain, the Royal Automobile Club, introduced a competition rating for such machines and fixed the limit of engine dimensions at 1100 cc. (approximately 67 cu. in.).

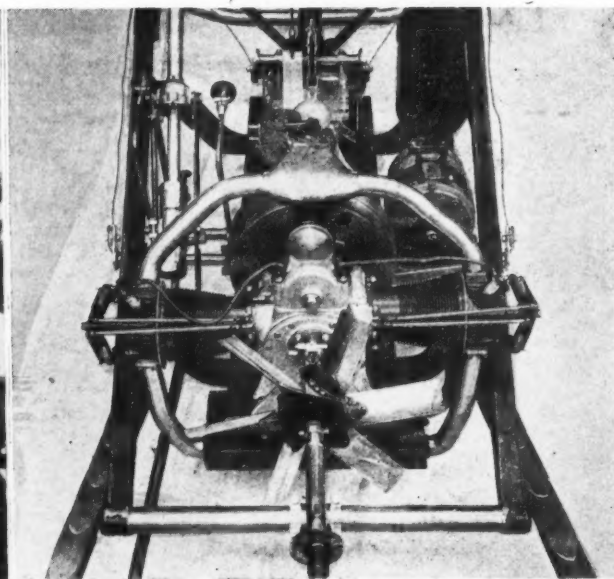
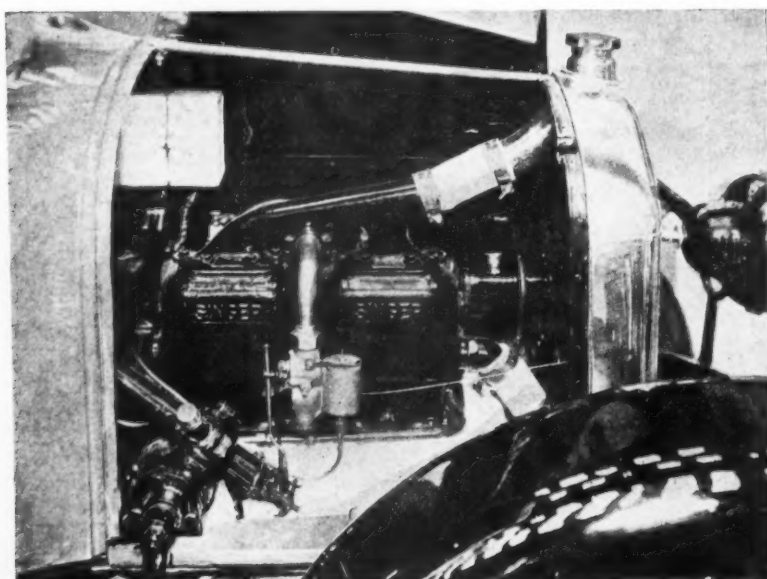
#### From Two Seaters to Four Seaters

At first these little chassis were fitted with two-seater bodies and occasionally with a small dickey seat for a third passenger behind but users were constantly loading them up with four adults. To meet an extension of the general demand, certain makers commenced to supply light four-passenger bodies, occasionally adopting a chassis with a somewhat longer wheelbase but usually maintaining the same engine, gearset and axles.

Next followed a demand for slightly larger engines and Humbers, among others, put out a chassis for two-passenger or four-passenger bodies with an engine of about 90 cu. in. One or two other firms followed suit but the majority maintained the smaller engine during 1914 and enabled it to cope with four-passenger bodies by fitting a lower ratio to the final drive.

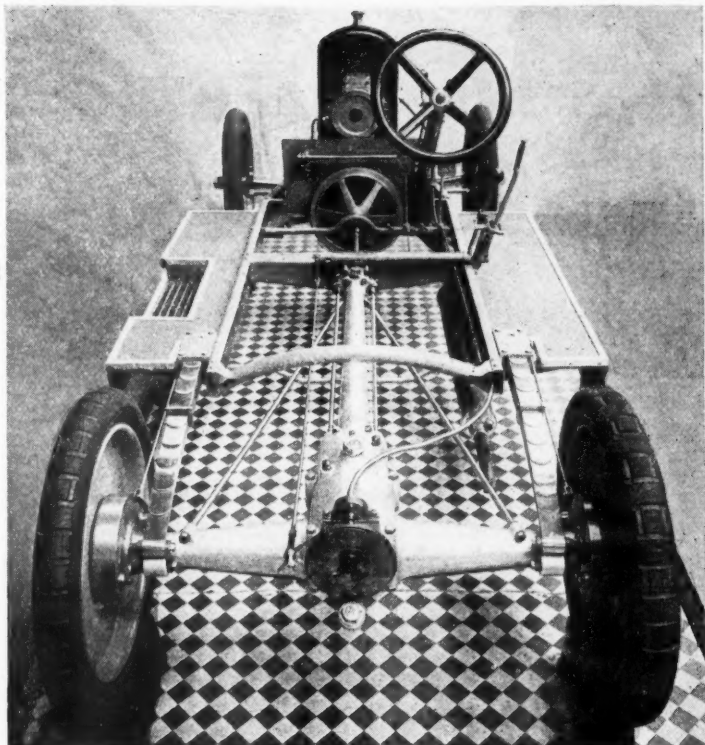
#### Three-Wheeler Survives War Period

Some makers, however, refused to accede to the demand for four-passenger bodies. Among these were Singer, Standard and Stellite (Wolseley). These companies maintain their 1914 attitude to the present day, although the Standard light car has an engine with the same bore as 1914, but with a longer stroke. Meanwhile the competition rating for light cars has risen and is now set at 1500 cc. (91.5 cu. in.). At the recent Olympia Show improved forms of the 1914 models were much in evidence and some, still with 67 cu. in. engines, had light four-seated bodies, notably the Calthorpe.

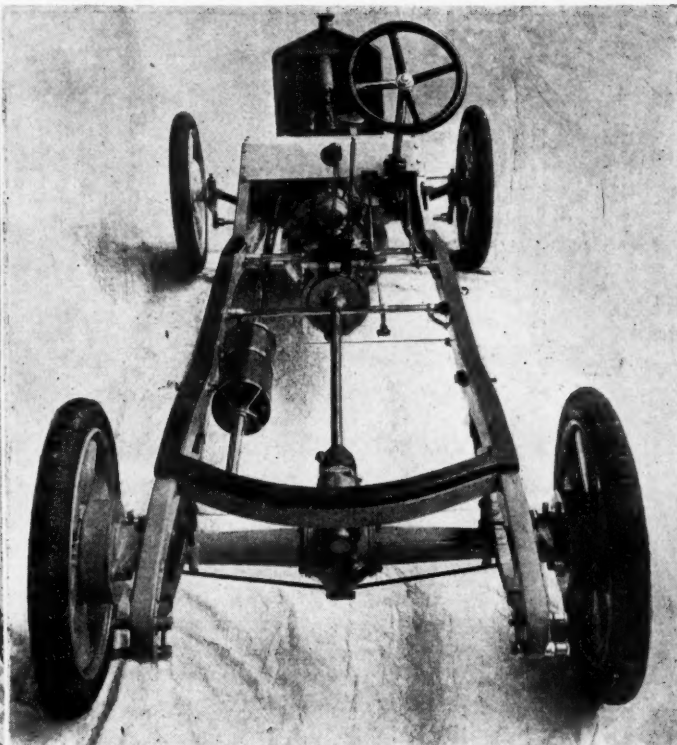


(Left) The 10-hp. Singer, the only British light car engine with pair-cast cylinders. (Right) Semi plan front view of the A. B. C. light car chassis, which has two horizontally opposed air-cooled cylinders and a four-speed gearset; in the latter respect it is unique among British light cars. Bore and stroke are approximately 3 1/8 x 3 1/8; piston displacement, 74.5 cu in.





Rear view of the 6-cylinder A. C. light car chassis. Has a three-speed gear incorporated with the worm-driven back axle; behind the latter is the disc type brake



The Briton light car chassis, one of the very few that has a unit engine and gearset and central control levers

Contemporaneously with the development of the four-wheeled light car, a three-wheeler was brought into prominence but, although prior to the war several of this pattern were introduced, the only one that has survived the war period is the Morgan. It is now being extensively copied in-so-far as general arrangement is concerned. The type, however, is still known as a cyclecar, and, as such, is limited under the competition rating to an engine of 61 cu. in.

The Morgan is a machine weighing about 700 lb. and has two steering wheels in front and the third, the driving wheel, behind. An air-cooled or water-cooled V-type two-cylinder engine is carried under a small hood at the front, the drive to the back wheel being through bevel gears and roller chains. For its size and power, it is an extremely good hill-climber and fast on the level. Among the younger generation of motorists it is extremely popular and, as a result, the type is being extensively copied.

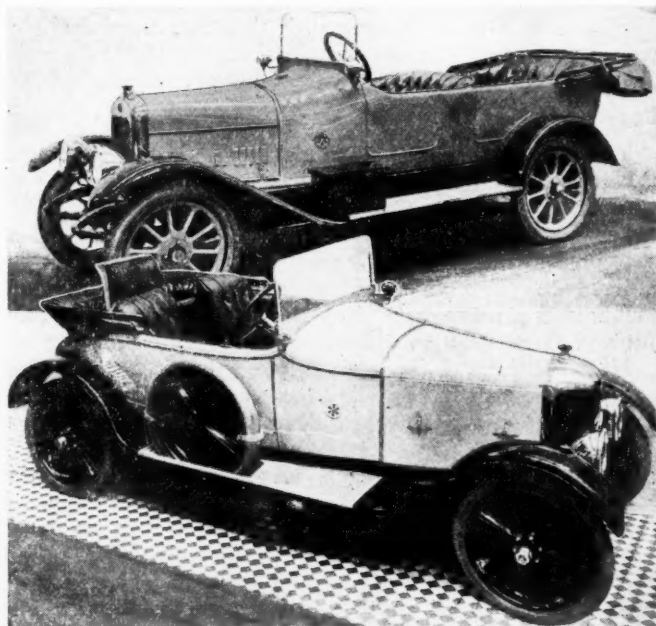
#### Engine Dimensions

The four-cylinder engine of the 1914 type of light car usually had a bore and stroke of about  $2\frac{1}{2} \times 3\frac{1}{2}$  in.; a block cylinder casting was generally used on an aluminum crank case, although the Singer (of which probably a larger number have been sold than any other make) had and still has pair-cast cylinders. Calthorpe and Singer retain straight bevel drive, while Standard and Wolseley continue to use a straight worm.

As regards prices, in 1914 these machines sold at about \$850 with acetylene lighting and no starter but their prices have risen to about double that figure, full electric equipment now being included. Usually the weight of the complete two-passenger car comes out between 1300 and 1400 lb. Three speeds are provided by a selector type gearset, usually mounted separately from the engine on a light sub-frame.

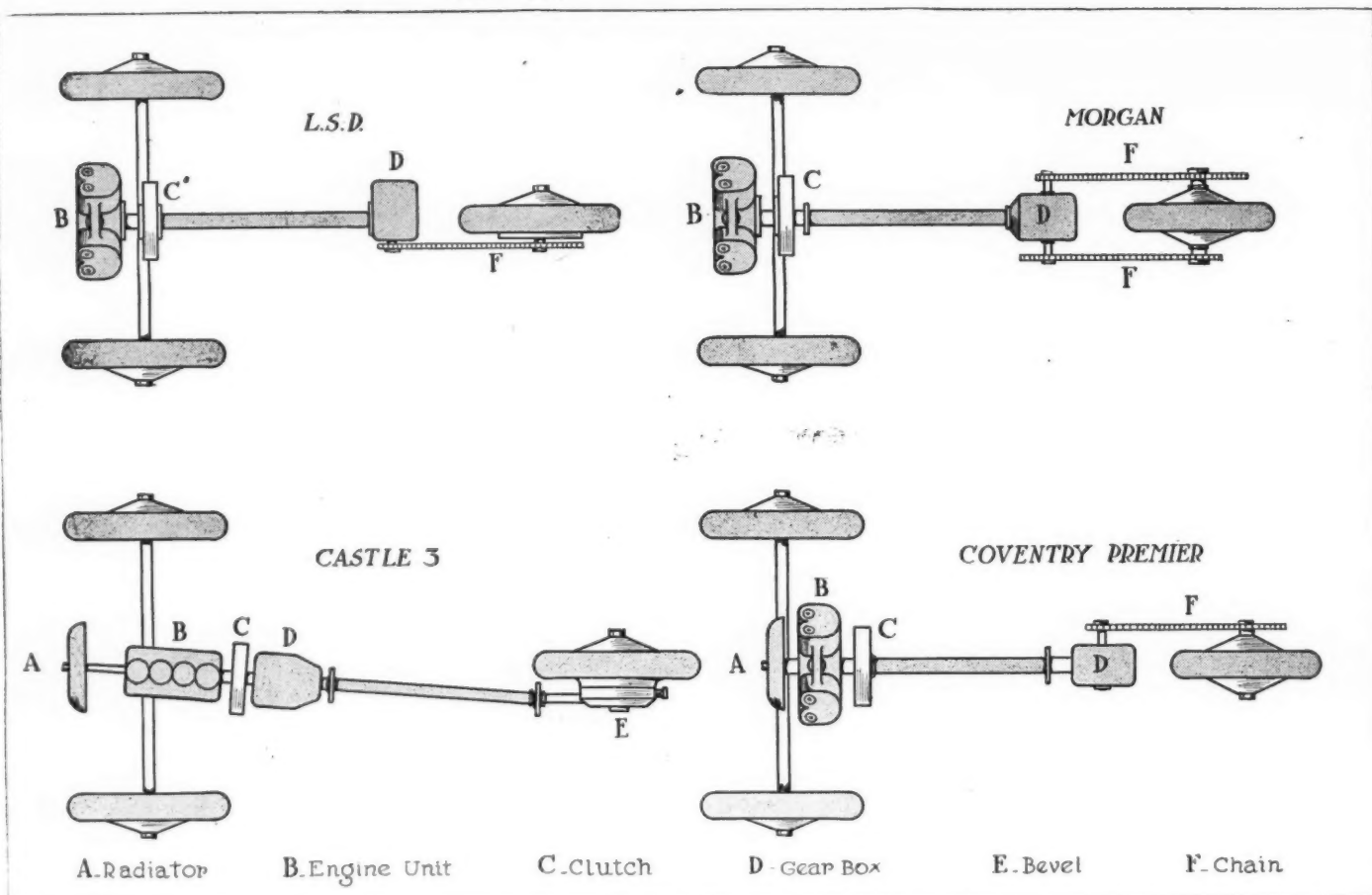
During the past twelve months the tendency to provide a larger engine has become gradually more pronounced

and quite a number of new firms are producing and were showing at Olympia small cars with light two- or four-passenger bodies and four-cylinder engines of 90 to 100 cu. in. capacity. But, simultaneously, the circle which was begun in 1912 is being re-commenced, for five or six firms have introduced two-cylinder air-cooled four-wheeled models. They are not on the old "cyclecar" lines



Above—Calthorpe four-seated light car; wheelbase, 99 in.; track, 45 in.; piston displacement, 77 cu. in.; weight, 1500 lb.

Below—A 6-cylinder light car, the overhead valve A. C.; wheelbase, 102 in.; track, 46 in.; piston displacement, 121 cu. in.; weight, 1550 lb.



Diagrams showing four types of drives used on British three-wheeled runabouts

but are well made, usually with gear and shaft drive, although in one or two instances with a friction disk transmission. The idea in these cases is once more to fill up the gap between the motorcycle and sidecar outfit and the now comparatively expensive light car. The aim has been to sell these air-cooled two-passenger machines, weighing 700 to 1000 lb. complete at the price of the 1914 four-cylinder light cars, namely \$850 or thereabouts.

#### Rover Co. Has Two Chassis

The best-known of the firms entering this market is the Rover company, which has standardized a chassis of this type in addition to their well-known 12 hp. model with a four-cylinder 3 x 4 $\frac{3}{4}$  in. engine. One or two of the newcomers making this class of machine have been obliged to raise their prices since the first announcements were made and one, during the Olympia Show, jumped from \$850 to \$1250.

Notwithstanding the high price of the present day four-cylinder light car, one or two makers have discerned a demand for a machine of this type of superfine grade and possessing refinements that are usually obtainable only in more powerful cars. As a result one firm, the A. C. company, has standardized a six-cylinder model-deluxe while the original Stellite is now taken under the wing of the parent company (Wolseley) and is being produced as a light car of the highest possible grade. This little machine, with two seats, four-cylinder block engine, overhead valves and overhead camshaft, a bore and stroke of 2 $\frac{1}{2}$  x 3 $\frac{3}{4}$  in., is selling readily at \$2100 and, although the makers have planned an output of some two or three thousand during 1920, they should have no difficulty whatever in disposing of all the cars of this type they can make.

At the present time, therefore, light cars may be classified as follows:

- (1) Three-wheeled "runabouts," generally with two-cylinder V-engines selling at \$700 to \$850.
- (2) Four-wheelers with two-cylinder horizontally opposed motors, usually air-cooled, with two-seated bodies, and priced at \$850 to \$1250.
- (3) Four-wheelers with four-cylinder engines of about 60 cu. in. capacity. Really big cars in miniature, costing up to \$2100.
- (4) Four-wheeled two- and four-seaters with four-cylinder engines of 90-100 cu. in. capacity, selling at \$2000 to \$2400.

Beyond these are small cars with engines of all the sizes intermediate between No. 4 above and the 15 hp. type of 4-5 passenger. Some are termed "light cars," but are not truly within the category implied by that term. They may be light from the power-to-weight ratio standpoint. But so is the new six-cylinder Napier, and the latter is obviously not a "light car" as generally understood.

#### Ground Speed Indicator

THE Bureau of Standards has made a study of the requirements for a successful ground speed indicator, together with experimental trials of a preliminary model. The chief requirement is a suitable stabilizer to hold the instrument in a horizontal position. A rigorous theoretical formula has been determined which serves as a criterion for the amount of departure from the true horizontal position that can be permitted without exceeding any given limit of error on the ground speed.



# Kansas City Show Reveals Growth and Advance of Tractor Industry

Seventy different machines, with a large representation of equipment manufacturers, make up the exhibits at the national display. Several interesting designs are being given their first showing and an interesting feature is that of the farm operative equipment. Tendencies in construction noted are the elimination of the fan belts, adoption of the line drive and attempts to obtain shorter turning radius.

KANSAS CITY, Mo., Feb. 16.

THE fifth annual National Tractor Show that was opened here to-day set a new record for such exhibitions. Three floors of the Overland Service building are occupied and each is filled with exhibits of tractors, tractor parts and accessories, power farm operative equipment and farm lighting plants.

The show is brilliantly staged with appropriate decorations. It presents an imposing appearance and is thoroughly representative of the tractor industry. All of the well-known makes and many of the more recent arrivals in the tractor industry are on view.

In all there are about seventy different makes of tractors. In contrast with the fifteen or twenty that comprised the earlier shows, this large number of machines is indicative of the wonderful growth of the tractor industry. Tractor engine transmissions and axles have a representation of practically 100 per cent. Manufacturers of the smaller parts, such as carbureters, magnetos, air cleaners, anti-friction bearings and mufflers, also are represented in force.

## The New Models

A distinctive feature of the show this year is the large display of farm operative equipment that has been designed especially for use with the tractor. This is indicative of the great advance that has been made in the production of power equipment within the last twelve months.

Among the new tractor models with distinctive features is the Hoosier. It has a novel wheel equipped with lugs that can be adjusted by the driver from his seat. The Hoosier also has a shield that protects the engine from the dust drawn through the radiator by the fan and an exhaust that uses the housing for the bull-gear as a muffler, preventing the entrance of dust or dirt into the final drive.

Another machine, shown here for the first time, is the Fitch four drive. This machine drives on all four wheels and presents some original features. In the rear axle, the power is transmitted by a Timken worm drive. The front axle is pivoted at its center for steering and the drive is by two pairs of bevel gears in series, the intermediate gear and pinion being on a vertical shaft concentric with the pivot support of the axle. There is a differential in each rear axle but none in the shaft driving to the axle.

A number of other tractors are being exhibited that previously have not been shown here. Among them are the Toga, Whetmore, Kardell, W. S. M. and one or two others. Most of them are assembled, indicating that manufacturers are making what are practically standard units that may be purchased by tractor makers.

Another new machine is the Bryan. It marks the entry of the steam driven machine into the modern tractor field.

## The Motor Cultivator

The number of motor cultivators is increasing, two new machines being shown this year, one made by the Rock Island Plow Company and one by the Wilson Tractor Company, the latter a Parrett production. In this class is the Samson Iron Horse, which was described in AUTOMOTIVE INDUSTRIES recently, and which is exhibited for the first time at a national show.

The small garden tractor is taking its place in the category of power equipment, and three new machines of this type are being shown. They are the New Britain, the Utilitor and the Oldsmar. By recent additions to several of the older lines of tractors and with some of the machines shown for the first time, the range of sizes is practically complete from the garden tractor to the giant 40-80, several of the latter size being on exhibition.

Some decided tendencies are noted. One of these is the elimination of fan belts and the combination of fan and pump drive. The line drive is another tendency that is gaining. A shorter turning radius is being gained by aiding the steering by disconnecting the power from one driving wheel.

SECRETARY MEREDITH of the Department of Agriculture, answering questions of newspaper men regarding means for reducing the high cost of living, stated that useless employees, no matter in what line they may be engaged, must be released from nonproductive work and given an opportunity to become producers upon the farm or in the factory. If this is done and if jobbers and retailers recognize the harm that must ultimately come from profiteering on the farmer and content themselves with a reasonable profit, the question of the high cost of living will largely solve itself to the permanent good of all. But unless the whole country—all business and all labor—does recognize this as a common problem and does the things necessary to solve it, less and less will there be of farm produce to divide among the whole people and higher will go the price of that which is produced.

# Analysis of German Trucks by the Motor Transport Corps

This article continues the report on the trucks surrendered to the A. E. F. under the terms of the armistice. The results of the investigations and tests are being made public as rapidly as they are completed for each truck.

By C. R. Hays\*

## Dux

**T**HE motor is a four-cylinder, L head, cast en bloc,  $4\frac{3}{8}$ -in. x  $5\frac{1}{2}$ -in. bore and stroke, four point suspension, suspension by upper half of case, the arms extending and fastening onto frame of truck.

### Cylinders

The valves are on the right hand side of the motor. The combustion chambers are a slight dome type; the bottom of the cylinder walls are counterbored and milled out for clearance of the connecting rods, the crankshaft being approximately  $\frac{5}{16}$  in. offset. The cylinder walls are  $\frac{3}{8}$  in. thick. The water enters into the front of motor, flows along under the valve seats and guides around to the opposite end of the motor, where it returns and is discharged over the top of the cylinders. The water jackets on the cylinders extend down half way the length of the cylinders, the water completely surrounding each cylinder wall. Valve guides are cast integral with the cylinders, 5 in. long. The exhaust is through individual ports and very symmetrical. The intake port is on the opposite side of the cylinder from the valve, running through the cylinders to the intake valves. Cast onto the exhaust manifold is a stove; the air intake from the carbureter passes over this, through the cylinder blocks to the carbureter, then from carbureter back through the cylinder block to the valve side. Priming cups are directly over the combustion chambers. On the opposite side from the valves are cast bosses for additional set of plugs. This cylinder block is an exceptionally good grade of casting and construction. When the cylinder block is in place, 3 in. of the cylinder barrel extends into the upper half of the crankcase.

### Flywheel

The flywheel is made of cast iron with flange cast integral with flywheel, having eight fan-shaped fins. The diameter is 25 in.; width, 6 in.; rim,  $2\frac{1}{2}$  in. The cone clutch is 17 in. outside. Counterbored  $3\frac{1}{4}$  in. for cone clutch.

### Crankcase

The upper half of the case is of cast iron and exceptionally heavily constructed, especially at the bearing points. The crankcase is so constructed that when the cylinder block is placed upon the case, 3 in. of the cylinder walls extend down into the case. This construction brings the bottom of the valve guides in the cylinders flush with the top of the crankcase. Instead

of the customary practice of taking the cover off the side of the cylinders in order to adjust the valve tappets, the cover is taken off of the crankcase, valve tappets being located on the side of the crankcase instead of on top. The cases are lap joints with no gaskets. The lower half of the crankcase is of cast iron, with a false pressed steel base. The oil sump is cast integral with the case, holding 4 gal. of oil.

### Crankshaft and Bearings

Crankshaft is a forging, machined all over. Shaft is exceptionally well constructed with good workmanship. It appears to have been Brinell tested. On the short cheeks are cast  $\frac{3}{4}$  in. brass circle oil collectors for collection of oil from the crankshaft bearings, by passing it through drilled cheeks and crankpins to connecting rods. The short cheeks are  $1\frac{1}{4}$  in. thick x  $2\frac{11}{16}$  in. wide; long cheeks are  $1\frac{1}{2}$  in. thick x  $2\frac{11}{16}$  in. wide. The flywheel hub is forged integral with the crankshaft with a continuation of the shaft for the clutch bearing.

Front and center crankshaft bearings are  $1\frac{15}{16}$  in. in diam. x  $3\frac{1}{2}$  in. long. Rear crankshaft bearing is  $1\frac{15}{16}$  in. x 4 in. long, babbitt lined and bronze backed, with cross type oil grooves; the lower halves are held by exceptionally heavy cast caps. When the cap is in place an additional forged steel heavily ribbed plate sits on top of the cap, held down by four  $\frac{5}{8}$  in. stud bolts. The oil enters under the shaft, through the caps, rising upward.

### Connecting Rods and Bearings

Connecting rods I beam, drop forging, offset and rough, being extra large.

Connecting rod bearings, babbitt lined, bronze backed, with cross oil grooves in upper half,  $1\frac{5}{16}$  in. in diam.,  $3\frac{1}{8}$  in. long, held in place by four  $\frac{1}{2}$  in. bolts and caps, with shim adjustments. Piston pin bearings are bronze sleeves, pressed into the rod.

### Pistons and Pins

Pistons, cast iron, flat head, with four  $\frac{1}{4}$  in. lap joint hammered concentric compression rings. The piston is  $5\frac{9}{16}$  in. long,  $1\frac{1}{8}$  in. in diam., located in the center of length of piston, and held in place by a brass plug at each end. Running around the center of the piston is a recess groove  $\frac{1}{64}$  in. x  $1\frac{1}{2}$  in. wide. No oil grooves or ribs on the skirt of the piston. The walls are  $\frac{5}{32}$  in. thick, and pistons are ground.

The camshaft is driven by a  $\frac{1}{2}$  in. pitch x  $2\frac{3}{4}$  in. with chain. The timing gear on the crankshaft is of steel,

\*Mr. Hays is chief of the experimental section, Motor Transport Corps.



hardened and pressed onto the shaft, held on by two straight keys. This gear is  $3\frac{1}{4}$  in. in diam. x  $2\frac{3}{4}$  face and 21 teeth. Timing gear on the camshaft is of cast iron, pressed onto the camshaft, held by straight key and nut. The center of the crankshaft and camshaft is  $7\frac{1}{4}$  in. There is no adjustment on this chain. The links are stamped out of soft steel,  $1/32$  in. thick, and are assembled in pairs. Only the outside links of the chain are hardened. The timing gears driving the cross shaft, operating the water pump and magneto, are spiral type and hardened, located on camshaft in rear of timing gear.

#### Camshaft and Bearings

The camshaft is hollow,  $1\frac{1}{8}$  in. in diam., hardened and ground with integral cams. The true circle of the cam is  $1\frac{1}{4}$  in.,  $\frac{3}{4}$  in. face,  $11/32$  in. lift. The front and rear bearings are ball bearings, the center bearing is a bronze sleeve, pressed into the crankcase. By a forged boss on the camshaft, this bearing is large enough to be slipped over the cams. On the rear of camshaft is a forged integral spiral gear for driving the oil pump.

#### Valves

Valves are of the mushroom type, 2-9/16 in. in diam. with 3/16 in. flat seat,  $9\frac{3}{4}$  in. long and  $\frac{1}{2}$  in. diam. stem. Valve springs are held on by a machined cap, and  $\frac{1}{8}$  in. x  $\frac{1}{2}$  in. straight key through the valve stem. Valve caps are of cast iron,  $1\frac{3}{4}$  in. long, and instead of a flat shoulder and gasket the seat is a  $45^\circ$  chamfer, both on the valve cap and in the cylinder. The spark plugs set into the deep pockets of the caps.

#### Valve Tappets and Guides

Valve tappet is mushroom type with a  $\frac{3}{4}$  in. diam. body, adjustment by adjusting tappet and lock nut. In the head of the adjusting tappet is inserted a fiber washer; the tappet guides are of bronze,  $3\frac{1}{8}$  in. long, with the upper end recessed out for oil pockets. The valve tappets are held down by integral lugs on one side and studs.

#### Governor

Governor is a fly ball type, located on a cross shaft in rear of camshaft timing gear. This shaft is driven by an integral spiral gear on the camshaft. The motion is carried from a sliding collar on the cross shaft by a forked bell crank arm extending through the timing gear case, from the arm to the governor valve by a rod.

#### Oiling System

The oiling system is gear pump driven by a shaft and spiral gear from the rear of the camshaft, and is located in the bottom of the sump, forcing the oil through a copper conduit pipe to each of three crankshaft bearings, the oil being forced through the caps underneath instead of through the upper half of the bearings in the case. From the bearings, the oil is collected by cast brass rings, and by-passed through drilled cheeks and pins to the connecting rod bearings. Balance of the motor and timing chain are lubricated by oil vapor from the case.

#### Water System

Water system is by a four blade, 5 in. bronze impeller, centrifugal pump, with a 1 in. intake and  $1\frac{1}{2}$  in. discharge. The pump body is of cast iron with aluminum cap, located on right hand side of the motor and driven by cross shaft, which drives the magneto; on this shaft is also located the governor.

Ignition system is a single system, high tension type, ZR4 Bosch magneto. Magneto is clockwise with the

customary advance by advancing the breaker box. For location of the secondary rotor a celluloid window is placed opposite contact number one in the secondary distributor cover. The magneto is located on the right hand side of the motor, and is driven by shaft and flexible coupling. The coupling is constructed out of thin, laminated spring steel.

#### Carbureter

Carbureter is a horizontal  $1\frac{5}{8}$  Zenith, of cast bronze, with a sheet brass float. Needle valve construction is a typical Zenith construction. The throat of the venturi is 23 mm. in diam. The adjustment is by a needle valve, and the high speed is stationary. Carbureter has a hot air adjustment. Two different fuels are used in this carbureter, the lighter fuel being used for starting and the heavier fuel for regular service. Carbureter valve is butterfly type.

#### Fan

Fan is  $22\frac{1}{2}$  in. in diam. The fan blades are cast integral with fan hub, which has fan pulley machined on rear end. Material, aluminum casting. The fan shaft is mounted on ball bearing with an adjustment on the rear. The fan bracket is made of cast iron, having a clevis end on side at the top. The fan shaft is enclosed in a cast iron casting with a clevis end on side, which fits inside of clevis on fan shaft bracket. This forms a toggle joint, which is controlled by three short levers pinned and held in place by a long stud with plain yoke end. The stud is threaded four inches with one side milled and used as a lock for the adjusting nut on end. The adjusting stud is assembled with coil spring, two retainers, one being on each end, and a wing nut complete.

#### Weights

Connecting rods and pistons complete, 16 lbs.; valve tappet assembly, 19 ounces; valve, 14 ounces; valve springs, 7 ounces.

#### Remarks

This motor has been constructed for exceptionally heavy service, probably being designed especially for heavy duty truck work. The workmanship on the parts is not of a polished type, but far above the average. All parts are very accessible. The cylinder block casting is of good design, and well manufactured. The magneto, carbureter and valve tappet adjustments are also easy to get to. All working parts are fully protected and lubricated. Like most of the German motors, everything is of cast iron, such as crankcases, cylinders, timing gear case, water pump body, fan driving pulley, manifolds, etc. The most difficult job on this motor is the casting of the upper half of the crankcase, which has evidently been done by foundrymen and designers, who are well posted on crankcase constructions.

**B**ERNARD BARUCH, formerly Chairman of War Industries Board, stated before a conference of War Department Officers Jan. 16 that formerly the United States was dependent upon Austria entirely for magnesite, the material used to line steel furnaces, and without which steel could not be produced. Americans were dependent almost wholly upon Chile for nitrates, and on other countries for other things. Mr. Baruch urged that industries built up in this country to meet war needs should not now be allowed to fail, and that as a further safeguard the United States should lay by stores of war minerals in quantity as might be needed in future conflicts.

# Chassis Details of New Models Point to Design Improvement

Details of construction, as seen at the 1920 shows, furnish Mr. Schipper with the groundwork for this article. He goes into the design of several cars and presents the arguments both for and against such practice, some of which may seem novel and radical.

By J. Edward Schipper

THE engineer who visits the automobile shows does not expect to gather information which will enable him to make radical changes in his product. He does expect, however, to pick up detail kinks which will help him meet problems of design in his own chassis. Probably he will not be able to copy these little tricks of design exactly, even if he so desired, but the methods by which certain problems have been solved always are useful.

Both on the new and old chassis this year, there are many things to be learned, as usual. In fact, in some of the smaller chassis details a great amount of ingenuity has been displayed, and there are many little niceties of design which, taken as a whole, are one of the reasons why cars of to-day are better than in previous years. These refinements are for quieting the chassis, for lightening it by allowing one part to fulfill the duties of two, or in some other way simplifying or improving it. As a concrete example, we note that in the Briscoe (Fig. 2) the cross-member forming a cradle support for the rear end of the engine is extended to also form the bracket for the running board step.

Needless to say, as far as rigidity is concerned this running board step will be amply strong to support the unusual load of suit cases and luggage often piled upon the running board by the automobilist. It cuts down the riveting necessary for the step and saves money in the way of material. The objection, of course, is that in case

of damage through collision this would necessitate the replacement of the entire cross-member, but, since it is a point at which the chances for breakage are remote, and, furthermore, since the part itself is particularly strong to withstand more than the ordinary shock, such replacements may not be necessary.

A somewhat similar idea is to be seen in Fig. 1 of the Cleveland car, where the rear spring front bracket is supported by a piece brought down from inside the frame. A study of this mounting, however, would lead to the idea that it would be possible to bring the cross-member

down to the frame and out from the side to an extent sufficient to act as a support for the spring bracket, thus not only acting as a tie-member, but also as a supporting unit on the bracket.

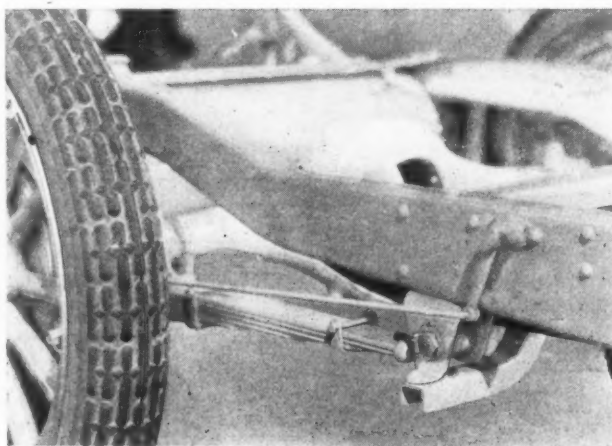


Fig. 1—Method of supporting the front rear spring brackets on the Cleveland

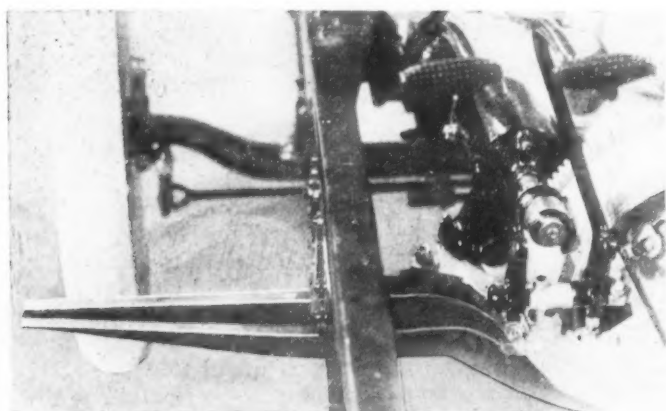


Fig. 2—On the Briscoe the rear end support is extended to form a running board bracket

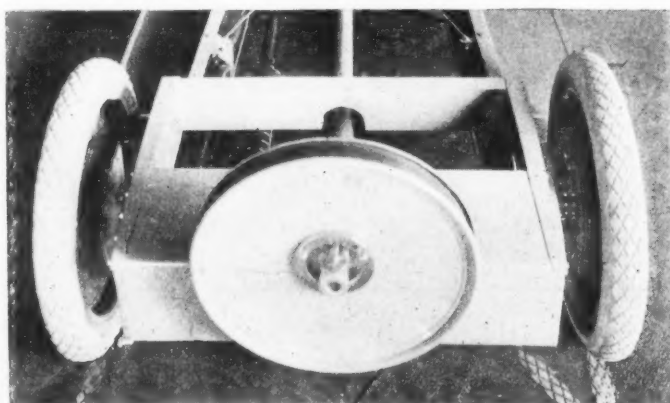


Fig. 3—The Fergus chassis as seen from the rear. This construction includes several features novel and original in American practice



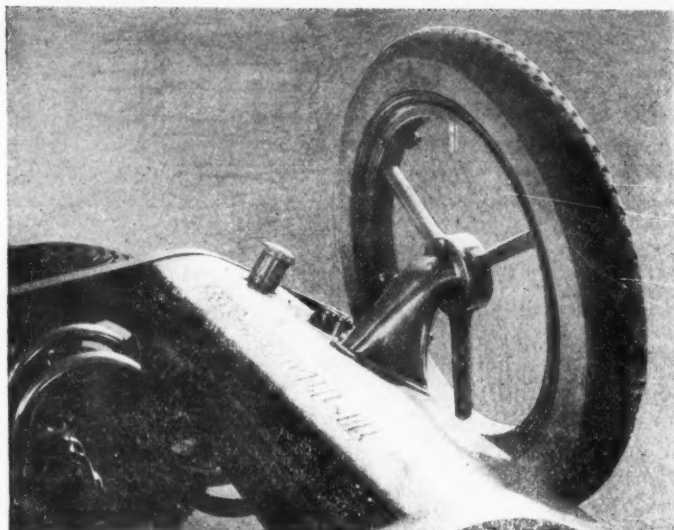


Fig. 4—The spare wheel carried on sheet metal cross-member

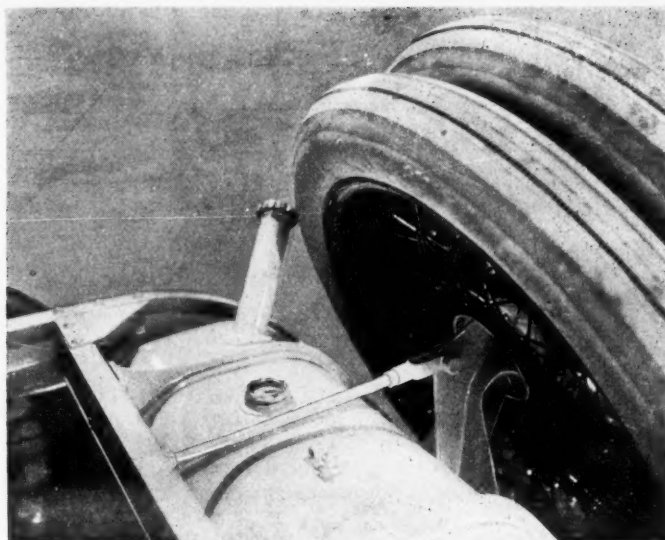


Fig. 5—Two spare wheels on Lexington carried on bracket supported by tie-rod to cross-member

It is important to allow one part to perform the duties of two wherever possible. This is one of the greatest schemes in saving weight that can be found, and there are scores of ingenious ways in which these results can be accomplished. Almost equally important, however, is the ability to secure rigidity in a simple manner.

#### Fergus Transmission Brake

We have all admired a great many of the ideas shown on the Fergus car and, although some of them are almost too idealistic for ordinary usage, nevertheless they present a target at which we can aim. Fig. 3 shows the Fergus chassis and illustrates clearly the manner in which a great deal of the simplicity is obtained. The use of a transmission brake, of course, cuts out one set of brake rods and links running back to the rear axle. The tie-rods running from the drum to the sides of the frame, however, are noteworthy in showing how this part of the chassis is tied together. It will be seen that the cross-member is below the propeller shaft at the forward end instead of above and the brake rocker shaft is above the propeller shaft. This is the reverse of American practice. The rear axle brakes are taken care of by cables and these are fastened in an ingenious method by entering tubes clamped to the brake rocker shaft shown in Fig. 3.

The box-like structure at the rear end and the method of carrying the spare wheel are other interesting points of the Fergus. The deep section of light material at the rear end of the chassis acts as a stiff structural support for the body and may be calculated to aid in eliminating some of the body squeaks that develop at the rear end. The structure is strong both in the transverse and longitudinal direction. The objection with this construction is probably in the necessity for using low seats in the tonneau and the arrangement of the rear space in the body should be taken into account in checking over this method of design.

#### Rear Tire Supports

The problem of bringing the rear tire support out behind the rear tank has been met in many ways. Two interesting methods are shown herewith. The Lexington, Fig. 4, has a sheet metal cross-member extending back of the rear tank from side member to side member. This is pierced by holes for the filler neck and the gasoline gage. Riveted to the cross-member is a bracket to carry

the spare tires. At first sight it would appear difficult to remove the tank from the chassis, but it may be dropped vertically downward more simply than would appear on the surface.

The installation of a double tire carrier, of course, presents even greater difficulty, and the Lexington has met this ingeniously by extending the frame beyond the tank and putting a substantial bracket on a rear cross-member, supporting this by a tie-rod to another cross-member in front of the tank. A rigid rear assembly results and, to prevent inaccessibility of the tank, the filler neck is quite long and extended to the side, as shown in Fig. 5. Two extra wire wheels are a heavy load, and the bracket, of course, must be substantially braced to take care of the extra stresses imposed by rough roads.

A great deal of interest was caused by the Roamer spring suspension, illustrated in Fig. 6. It is a double cantilever arrangement with different centers to break up periodicity. With the different centers provided by these springs, it would seem that rebound would be quickly taken up and the chassis brought back to normal position in a correspondingly short time. It will be interesting to see how this works out after a season in the hands of users.

It incorporates a great many ideas of which we have been speaking from time to time and may be the means of rendering the rear seat more comfortable than it is in a great many of even our best touring cars.

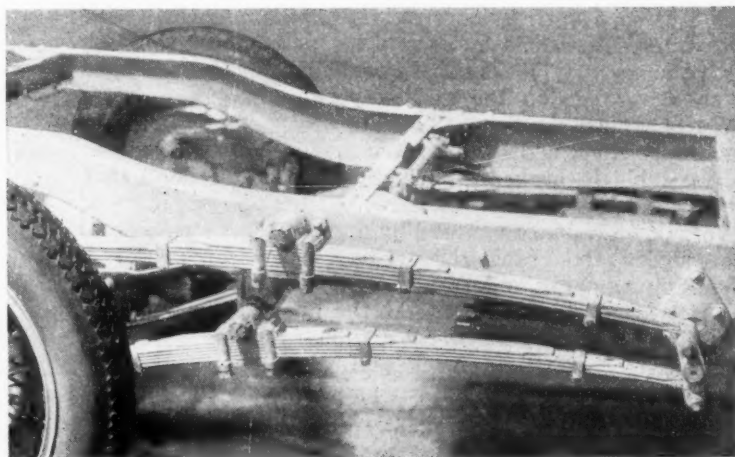


Fig. 6—The Roamer double cantilever spring suspension

# Jump Tests Show Action of Truck Springs and Tires

Interesting experiments, outlined herewith, were made by International engineers in their studies of road impacts and the differing results of solids and pneumatics in truck operations. The tests were productive of much worthwhile data for the solution of this problem.

By Alfred F. Masury\*

**W**HILE engineers are agreed that pneumatic tires reduce road impact and resultant shock to the chassis and that the effect of light unsprung weight is similar, it was not until recently that actual tests were conducted to give physical proof of these assumptions. Such tests have been made by the International Motor Co., employing a novel type of motion picture for the close study of the motion of the parts while negotiating obstructions and striking the earth.

In these tests results were recorded photographically, using a new type of motion picture camera by which pictures could be taken at the rate of 160 exposures per second and which, when projected, showed down the action to one-tenth the normal speed. The results were so convincing that one tire manufacturer has already begun similar tests to compare the impact effect of pneumatic and solid tire equipment on motor trucks.

The purpose of the tests was to subject various types and sizes to shocks in excess of anything likely to be encountered in actual service and to make careful observations of the effect of road impact on spring and tire equipment, as well as the effect of unsprung weight upon road impact. The trucks were run at speeds from 15 to 18 m.p.h. along a straight-away and over a sharp incline rising 1½ feet high in a distance of six feet. (They naturally sprang into the air and struck the ground as from a vertical drop of two or three feet.) In each case the speed of the truck was determined by having it make a flying start and timing it with a stop watch over a measured course of 100 feet from a line to the base of the incline.

The time of flight through the air of each axle, the time of deflection of each spring and tire, the time of rebound of each spring and tire, and similar details of the tests were determined by several means to check the data for accuracy. (A) An Eastman kodak timer was used to show seconds on the motion picture films that were taken to record the tests. (B) An ordinary hand sewing machine, with a white card fitted on the plunger, was set on the table in back of the incline and so adjusted that the card rose and fell three times with each revolution of the crank. This was operated by a man with a stop watch, who turned the crank three times per second. (C) A phonograph, motor and turntable mounted in a box, was placed on the stone buttress at the near side of the incline, the turntable carrying a cardboard cylinder marked off in four sections in black and white, the first solid black, the second white on top and black at the bottom, the third, solid white, and the fourth black on top and white at the bottom. The governor of the motor was set

for 60 r.p.m., so that the pattern on the cylinder showed quarter-seconds. All of these instruments were put into action simultaneously with the running of each truck over the incline and recorded together both by still and motion pictures.

The horizontal distance which the trucks jumped was measured by a curbing along the back of the runway marked off in feet. A large blackboard near the incline, marked off in feet, both vertically and horizontally, showed the vertical rise of the different portions of the truck. The rims of the tires, one spoke on each wheel and the hub-caps were painted white, for the purpose of measuring wheel revolutions. To measure spring deflections, a strip of sheet metal extending down from the lip of the fender was marked off in black and white at 3-inch intervals, to show the rise and fall of the hub. The tire deflection was measured by means of the white rims and the white spoke enabled the revolutions of the wheel in the air to be counted.

In addition to numerous still pictures with different forms of cameras, motion pictures of the two kinds were taken to permit analysis in the laboratory. One of these was the standard motion picture machine taking 16 exposures per second and the other a Novograph, a new type of camera, which takes pictures nine times as fast as the normal projector, or 144 exposures per second. Each jump was photographed simultaneously by both cameras and a composite film made up in which each jump was shown first at normal speed and then "slowed down" by the Novograph. This film was then projected at normal speed, whereby each jump was shown twice, the first time



Solid tired truck weighing 11,870 lb. leaving the take-off at 15 miles per hour. The timing devices are well shown on the concrete block to the left of the figure

\*Chief Engineer, International Motor Co.



as it actually appeared and then at one-ninth normal speed, which allowed the eye to trace the intricate movements of the different parts as the flight through the air was made. These films were studied, both running and still, accurate measurements and calculations were made, and conclusions were drawn.

The trucks tested comprised the following: one standard Mack AB 1½-tonner, having pneumatic tires on front and solids on the rear, and an experimental gear-driven axle; an AB 2-tonner, with pneumatic tires all around and the same type of rear axle; an experimental 3-ton truck; a 3½-ton, chain-driven AC model, and a 5½-ton AC with an experimental chain drive. These were numbered as follows: E-8, E-17, E-15, E-22, and E-18.

#### True to Theoretical Assumptions.

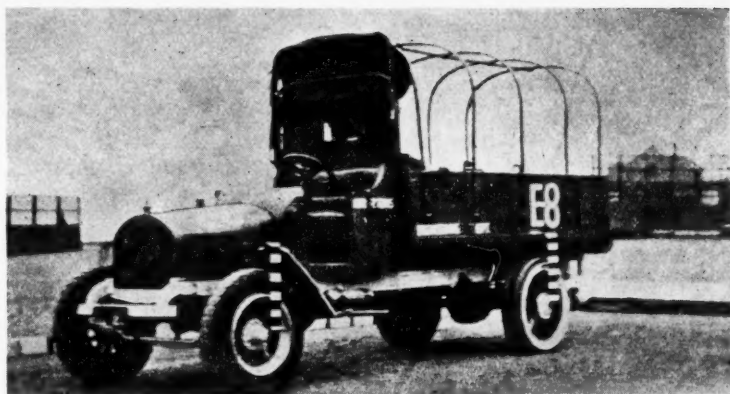
The conclusions drawn from the tests are that the impact of a truck striking the ground after bounding over an obstruction is approximately proportional to the square of the speed and to the weight, and inversely proportional to the resiliency of the springs and tires. By this is meant that while at given speed twice the weight will strike the ground with twice the force from a given height, if the same weight strikes the ground at twice the speed, it will strike the ground four times as hard; but that springs or tires twice as resilient will halve the impact.

Two of the trucks were of similar design, one having solid rear tires and the other pneumatics all around. A comparison of the results shown by these two is most interesting. The one with solid rear tires weighed 9,730 lb., and the one on pneumatic tires 10,200 lb. The lighter one had 6,400 lb. on the rear tires and the other 7,100 lb. The former had 1,000 lb. spring deflection per inch and the latter 1,183 lb.

Going over the jump at 17 1/10 m.p.h., the lighter truck jumped 17 ft. 3 in.; the other, 17 ft. 7 in. Thus they jumped about the same distance at the same speed. Their weight was similar and they had about the same proportion of sprung to unsprung weight. Their springs were also similar and yet when the forces set up by the shock of landing were figured an astonishing difference was found, which could only be accounted for by the difference in tire deflection between the solid and pneumatic tires.

The solid-tired truck showed a spring deflection of ¾ in. and a tire deflection of 1 in. The pneumatic-tired truck showed a 5½-in. spring deflection and 4½-in. tire deflection, all of these figures being taken on the rear wheels only. The force with which the unsprung portions of the solid-tired truck struck the ground was 14,336 lb., as against 4,624 lb. with the pneumatic-tired truck. Those on the sprung portions of the solid-tired truck were 13,014 lb., as against 9,282 lb. on the pneumatic-tired one.

From this we see that whereas the pneumatic-tired truck had 620 lb. more weight on the rear axle, it went over the same jump at the same speed as the solid-tired one, but owing to the greater deflection of the pneumatic tires, 450 per cent greater than the solids, it hit the ground with only about one-third the impact. In other words, its unsprung impact on the ground was 9712 lb. or 68 per cent less than that of the solid-tired truck. This was not directly due entirely to tire deflection, of course, for we have seen that there was greater spring deflection, but this is all the more remarkable, for we have seen that these springs were 183 lb. each, or 366 lb. for both rear springs, stiffer than those of the solid-tired truck. The only way it can be accounted for is that the deflection of the pneumatic tires served to so lessen the rebound of the unsprung portion of the truck as to give the effect of lighter unsprung weight, and consequently to lessen the resistance



The uprights pending from the chassis by the hubs were painted as shown on alternate 3-in. bands of black and white. These show in photographs of the jumps the amount of spring deflection.

of the axle to the deflection of the spring. This represents the effect of impact on the road. The forces acting through the sprung portions of the truck represent the reaction of the blow on the vehicle itself. The sprung force was 3732 lb. or 29 per cent less on the pneumatic-tired truck than on the solid-tired one, which is natural, considering that less impact of the unsprung portions of the road would produce less reactive thrust on the frame.

The pneumatic, therefore, saved the road two-thirds the grief and the vehicle itself one-fourth. Following the thought to its logical conclusions, it would seem obvious that a 7½-ton truck on pneumatic tires would do less damage to the road than a 5-tonner on solid tires, operating over the same route and at the same speeds.

The summarized results of the tests, as compiled by the Mack engineers, are given herewith:

#### COMPARISON OF DISTANCES "JUMPED" BY EACH TRUCK AND MILES PER HOUR AT WHICH THE TRUCKS TOOK OFF

	Miles Per Hour			Distance in Feet		
	1st Jump	2nd Jump	3rd Jump	1st Jump	2nd Jump	3rd Jump
E-8 .....	16.8	13.6	17.1	14' 6"	15' 0"	17' 3"
E-15 .....	13.6	15.1	9.6	11' 1"	15' 7"	7' 0"
E-17 .....	11.3	16.8	17.1	6' 6½"	14' 7"	17' 1"
E-18 .....	15.1			9' 2"		
E-22 .....	13.6	14.3		13' 5"	15' 0"	

#### WEIGHTS OF THE TRUCKS

Truck No.	Front	Rear	Total
E-8.....	3250	6480	9730
E-15.....	3453	8417	11870
E-17.....	3100	7100	10200
E-18.....	5480	13500	18980
E-22.....	5850	14650	20500

The weights on the rear are made up as follows:

Truck No.	Unsprung	Sprung
E-8.....	1716	4764
E-15.....	2140	6277
E-17.....	1754	5346
E-18.....	3136	10364
E-22.....	2446	12204

The energy exerted by a falling body is equal to the energy required to raise it to the height from which it fell. If the vertical velocity and weight are known the energy equals the weight times the vertical velocity squared, divided by twice the acceleration due to gravity, or

$$E = \frac{WV^2}{2G} = \frac{WV^2}{64.32}$$

where  $W$  = Weight in lb.

$V$  = Vertical velocity in ft. p. s.

In the case of a motor truck driven over an upward inclined plane, the vertical velocity can be obtained from the speed of the truck and the angle of the incline, or



The general layout—From the right: take-off, 18 in. high at the edge, 6 ft. long; the black board squared in feet to register height, the ground strips marked in feet to register length of jump, and a line of clockers, checkers and measurers

$$V = \frac{S \times 88T}{60} = \frac{22ST}{15}$$

$S$  = Speed in m.p.h.

$T$  = Tangent of angle or incline.

The average force of a blow equals the energy of a moving body in ft.-lb. divided by the distance of feet required to stop it, plus the weight of the body, or

$$F = \frac{E}{D} + W$$

where  $D$  = Distance required to stop, in ft.

Combining 1, 2 and 3,

$$F = \frac{W \left( \frac{22ST}{15} \right)^2}{64.32D} + W$$

This formula can be applied to the unsprung weight of a motor truck by taking the deflection in the tires and ground, and to the sprung weight by taking the spring and tire deflection.

Applying this formula to the trucks jumping, we get the following results:

Truck No.	Speed	$V^2$	Rear Un-sprung	Rear Sprung	Spring and Tire De-flection	Tire De-flection
E-8.....	17.1	29.4	1716	4764	0.083	0.354
E-15.....	15.1	30.6	2040	6277	0.083	0.666
E-17.....	17.1	39.4	1754	5346	0.375	0.833
E-18.....	15.1	30.6	3136	10364	0.083	0.264
E-22.....	14.3	27.4	2446	12204	0.083	

	Unsprung Force	Sprung Force	Sprung Force from Spring Deflection
E-8.....	14336	13014	3250
E-15.....	13890	10757	....
E-17.....	4624	9286	6800
E-18.....	21076	29004	4100
E-22.....	14866		

The deflection per inch of each rear spring:

Truck No.	Measured Deflection lb. per in.	Part No.	Calculated
E-8.....		13AB226	(3250 in 3¼ in.) = 1000
E-15.....		13AD25	
E-17.....	1233 lb.	13AB227	(3700 in 3¼ in.) = 1183
E-18.....	1883 lb.	13AC29D	(6400 in 3⅞ in.) = 2000
E-22.....	1700 lb.	13AC29C	(6400 in 3¼ in.) = 1750

Deflection of rear springs and tires are measured from the photographs in inches:

Truck No.	Spring Deflection	Extension	Tire Deflection
E-8.....	3¼	4	1
E-15.....	7	1¼	1
E-17.....	5½	1¾	4½
E-18.....	2⅞	1½	1
E-22.....			1

The force of the blow on the ground from the unsprung and sprung weight can be figured by this formula. These forces should not be added together for they do not occur at the same time.

## Research Association of British Motor Manufacturers

TO the automobile industry belongs the credit of being the first branch of the British engineering industry to form a research association. For some time past negotiations have been carried on between the Government Department of Scientific and Industrial Research and the Association of British Motor and Allied Manufacturers, with the result that the Research Association of the British Motor Industry has been formed under conditions entitling it to substantial financial assistance from the government. That the movement is receiving influential support from the industry is apparent from the composition of the Council of the association formed as follows:

H. C. B. Underdown, A. I. A. E., Commercial Cars, Ltd. (chairman)  
 Dr. T. Blackwood Murray, D. Sc., M. I. A. E., M. I. C. E., M. I. E. E., Albion Motor Car Co., Ltd.  
 Lieut.-Col. J. A. Cole, Humber, Ltd.  
 A. E. Berriman, M. I. A. E., M. I. Mech. E., Daimler Co.  
 R. Clayton, M. I. A. E., Clayton & Co., Huddersfield, Ltd.  
 A. Craig, M. I. A. E., M. I. Mech. E., Maudslay Motors, Ltd.  
 W. Letts, C. B. E., Crossley Motors, Ltd.  
 R. Maudslay, M. I. A. E., Standard Motor Co., Ltd.  
 A. McCormack, M. I. A. E., Wolseley Motors, Ltd.  
 J. W. Mills, M. I. A. E., M. I. E. S., Halley's Industrial Motors, Ltd.  
 T. C. Pullinger, M. I. A. E., Arrol-Johnston, Ltd.  
 S. Straker, M. I. A. E., A. M. I. C. E., M. I. Mech. E., Straker-Squire, Ltd.  
 T. Thorneycroft, John I. Thorneycroft & Co., Ltd.  
 L. Walton, Vauxhall Motors, Ltd.

This Council has power to add to its members and will doubtless exercise this power when the association has been further strengthened by the inclusion of several important firms, in respect to which the elections are not complete.

Those who are conversant with the British automotive industry will recognize that the Council forms a combination in which the commercial and the technical elements are evenly balanced. The Council will approve the work to be undertaken by the research association. The work will be prepared by a Committee of Research, which will be formed by the Council and which will consist solely of highly qualified scientific and technical men. This committee will exercise general control over the leading technical officials of the association, who will be responsible for the detailed conduct. Close co-operation with the Institution of Automobile Engineers will be maintained.

The activities of the association will fall under two main headings; (1) the collection and dissemination of scientific information of value to the industry, and (2) actual research and experiment. It is not intended in the first instance to establish laboratories but rather to utilize existing institutions.



# Farm Lighting and Power Plant Specifications

IN the accompanying table are given specifications of 48 isolated electric light and power plants ranging in capacity from 1.3 to 6 kw. Most of these plants were specially designed for use on farms and country estates, while a few were developed for war purposes and are continued as meeting a certain peace-time demand. An output of 1 kw. or close to it is common, and this seems to best meet the requirements of the average farmer who wants light mainly. The great majority of the engines are single cylinder uprights, but there are two two-cylinder engines listed and four four-cylinder ones. While several of the most prominent makes use ball and roller bearings on the crankshaft, babbitt-lined bearings are used in most instances. Water cooling is common, though air cooling has advantages for an outfit that is expected to run for long periods without attention. In one case, oil is used as the cooling fluid to overcome the freezing difficulty.

Ignition is almost equally divided between battery and magneto system and one manufacturer gives customers an option, fitting either the one or the other.

About two-thirds of the systems are adapted to burn kerosene, while the rest use gasoline only. Two voltages are standard, viz., 32 and 110. For the former 16 battery cells are invariably used, while either 54 or 56 cells are used with 110 volts. There is considerable variation in the proportionate amount of battery capacity provided, ranging from about 3 to about 10 kw.-hrs. per kilowatt generator output, but the average is very close to 5.4 kw. hrs. There is also an enormous range in the governed engine speeds, from 340 to 2000 r.p.m. Two speeds have recently been adopted by the S. A. E. as standard for farm lighting plants, namely, 1200 and 1800 r.p.m., but there is really little indication in the table that the speeds gravitate toward the two figures.

Name and Model	Price	Number Cylinders Bore and Stroke	Type of Valves	BEAR'NG MATERIAL		Cooling Medium	IGNITION		Governed Engine Speed	Type of Governor	Fuel	BATTERY			No. Poles	Types of Field Winding	Generator Voltage	Nominal Output, Kw.	Armature Mounted on Crankshaft	
				Crank Pin	Main Crank-shaft		Source	Voltage				No. Cells	Volts	Ampere Hour Capacity at Intermittent Ratings						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
Aero Thrust		2-2 1/4 x 2 1/4		Bronze.	Bronze.	Air	Mag.		1800		G or K.		32		4	Shunt.....	32	0.33	No	
Alamo.		1-2 1/4 x 3 1/2	R-Sl.	Bronze.	Babbitt.	Water.	Mag.		2000	Soloid.	G.	16	32	143-191	2	Compound.....	40	1.00	Yes	
Black Swan.	Everlite	1-2 3/4 x 4	Pop.	Bronze.	Ball	Water.	Bat.	32	1400		G.	16	32	95-275	4	Shunt.....	40	1.00	Yes	
Doesmore	A	525	1-4 x 4	Babbitt.	Babbitt.	Water.	Opt.	6	800		G.	16	32	112	4	Shunt.....	32-42	1.00	No	
Doesmore	C	575	1-4 x 4	Babbitt.	Babbitt.	Water.	Opt.	6	800		G.	16	32	168	4	Shunt.....	32-42	1.00	No	
Doesmore	F	650	1-4 x 4	Babbitt.	Babbitt.	Water.	Opt.	6	800		G.	16	32	250	4	Shunt.....	32-42	1.00	No	
Delco-Light	216	545	1-2 1/2 x 5	Pop.	Babbitt.	B. & R.	Air	Bat.	32		K or G.	16	32	160	4	Shunt.....	32	0.75	Yes	
Delco-Light	337		1-3 1/4 x 6	Pop.	Babbitt.	B. & R.	Air	Bat.	32		Own.	K or G	16	32	160	6	Shunt.....	32	3.00	Yes
Delco-Light	316		1-3 1/4 x 6	Pop.	Babbitt.	B. & R.	Air	Bat.	32		Own.	K or G	56	110	160	6	Shunt.....		3.00	Yes
Everlite	25-A-9	545	1-2 3/4 x 4	Pop.	Bronze.	Ball	Water.	Bat.	32	1200		G.	16	32	190	2	Shunt.....	40-42	1.00	No
Genco Lite.	A	525	1-3 1/4 x 3	Pop.	Bronze.	Babbitt.	Water.	Bat.	32	1200		K or G	16	32	110	2	Shunt.....	36	0.90	No
Genco Lite.	B	610	1-3 1/4 x 3	Pop.	Bronze.	Babbitt.	Water.	Bat.	32	1200		K or G	16	32	167	2	Shunt.....	36	0.90	No
Genco Lite.	C		1-3 1/4 x 4	Pop.	Bronze.	Babbitt.	Water.	Mag.			K or G	54	110	110	4	Shunt.....	125	4.12	No	
Genco Lite.	D		2-3 1/4 x 4	Pop.	Bronze.	Babbitt.	Water.	Mag.			K or G	54	110	167	4	Shunt.....	125	4.12	No	
Gray & Davis.			1-2 1/2 x 2 1/2	Pop.	Babbitt.	Ball	Air	Gen.	32		Carb.	G.	16	32	50	4	Shunt.....	32-42	0.35	Yes
Lally Light	F		1-2 1/2 x 2		Ball	Ball	Water.	Bat.	32	1800		G.	16	32	115	2	Shunt.....	32-42	1.00	No
Langstadt Meyer.	2-C-6		4-3 1/4 x 4 1/2	Pop.	Babbitt.	Babbitt.	Water.	Mag.	1100	Cent.	G.	56	112	Opt.	4	Comp. or Shunt	110	6.00	No	
Langstadt Meyer.	2-A-4		4-2 1/2 x 4	Pop.	Babbitt.	Babbitt.	Water.	Mag.	950	Cent.	G.	56	112	Opt.	4	Comp. or Shunt	110	4.00	No	
Langstadt Meyer.	2-A-5		4-2 1/2 x 4	Pop.	Babbitt.	Babbitt.	Water.	Mag.	1100	Cent.	G.	56	112	Opt.	4	Comp. or Shunt	110	5.00	No	
Langstadt Meyer.	B1 1/2		1-3 1/4 x 4 1/2	Pop.	Babbitt.	Babbitt.	Water.	Bat.	32	1200	Cent.	K or G	16	32	80-120	4	Shunt.....	32-40	1.50	No
Lauson	Jr.		1-3 1/2 x 5	Pop.	Babbitt.	Babbitt.	Water.	Mag.	6	475	Cent.	G.	15	30	25	2	Series.....	30	0.80	No
Lauson	202		1-4 1/2 x 6	Pop.	Babbitt.	Babbitt.	Water.	Mag.	6	450		K, G & D	26	30	75	2	Series.....	50	1.40	No
Lauson	203		1-5 1/4 x 7	Pop.	Babbitt.	Babbitt.	Water.	Mag.	6	425		K or G	26	30	112 1/2	2	Series.....	50	2.00	No
Main-Light.	XX	175	No engine	furnis	hed							15	30	40	2	Shunt.....	40	0.20	No	
Main-Light.		250	1-3 1/4 x 4 1/2	Pop.	Bronze.	Babbitt.	Water.	Mag.			K or G	15	30	60	2	Shunt.....	40	0.60	No	
Main-Light.		475	1-3 1/4 x 4 1/2	Pop.	Bronze.	Babbitt.	Water.	Mag.			K or G	15	30	60	2	Shunt.....	40	0.80	No	
Main-Light.		680	1-4 1/2 x 8	Pop.	Bronze.	Babbitt.	Water.	Mag.			K or G	15	30	95	2	Shunt.....	40	1.00	No	
Main-Light.		1150	1-6 1/2 x 8	Pop.	Bronze.	Babbitt.	Water.	Mag.			K or G	15	30		4	Shunt.....	40	3.00	No	
Mayhew	K1	525	1-2 1/2 x 4	Pop.	Babbitt.	Babbitt.	Water.	Bat.	32	1400		K or G	16	32	90	4	Compound.....	40	1.00	No
Mayhew	K2	550	1-2 1/2 x 4	Pop.	Babbitt.	Babbitt.	Water.	Bat.	32	1400		K or G	16	32	120	4	Compound.....	40	1.00	No
Mayhew	K3	600	1-2 1/2 x 4	Pop.	Babbitt.	Babbitt.	Water.	Bat.	32	1400		K or G	16	32	160	4	Compound.....	40	1.00	No
Perfection	SA1	550	1-3 1/4 x 3 1/4	Pop.	Babbitt.	Babbitt.	Water.	Bat.	32	1150	Carb.	K, G, A	16	32	112	2	Shunt.....	30-40	1.20	No
Perfection	SA6	615	1-3 1/4 x 3 1/4	Pop.	Babbitt.	Babbitt.	Water.	Bat.	32	1150	Carb.	K, G, A	32	65	56	2	Shunt.....	30-40	1.20	No
Perfection	SA12		1-3 1/4 x 3 1/4	Pop.	Babbitt.	Babbitt.	Water.	Bat.	32	1150	Carb.	K, G, A	56	110	112	2	Shunt.....	30-40	1.20	No
Pioneer	E		1-5 x 6 1/2	Pop.	Babbitt.	Babbitt.	Water.	Mag.	450		K or G	16	32	136-280	4	Compound.....	32	1.50	No	
Pioneer	C		1-5 x 6 1/2	Pop.	Babbitt.	Babbitt.	Water.	Mag.	460		K or G	56	110	66-136	4	Compound.....	110	2.50	No	
Powerlite			1-3 1/4 x 3 1/4	Pop.	Babbitt.	Bronze	Air & water	Bat.	32	1400		K or G	16	32	100-200	2	Shunt.....	40	1.00	No
Powerlite			No engine	furnis	hed							16	32	100-200	4	Shunt.....	40	1.00	No	
Sunnyhome			1-2 1/2 x 3	Pop.	Babbitt.	Roller.	Oil	Bat.	110	2000		G.	54	110	36	2	Shunt.....	110	1.25	No
Swanlite			1-3 x 4	Pop.	Bronze.	Babbitt.	Water.	Bat.	32	1100		G.	16	32	95-275	4	Shunt.....	40	1.00	No
Swartz	D		1-3 x 3 1/4	Pop.	Babbitt.	Babbitt.	Water.	Mag.	900		Elect.	G.	16	32	136	4	Compound.....	32	1.00	Yes
Unilectric	H-S		1-2 1/2 x 3	Sl.	Steel		Water.	Mag.		1500	Elec	G.	3	6		2	Shunt.....	115	1.00	No
West-Elec.	15-90		1-3 1/4 x 4 1/2	Pop.	Babbitt.	Bronze.	Air	Bat.	32		Cent.	K or G.	16	32	135-270	4	Shunt.....	35-42	1.68	Yes
Willys Light.	G-M	525	1-2 1/2 x 3 1/2	Sl.	Babbitt.	Babbitt.	Air	Gen.	6	1150	Carb.	K	16	32	225	4	Shunt.....	32	0.76	Yes
Winton.	W17		4-3 x 4	Pop.	Babbitt.	Babbitt.		Mag.	1200		G.	50	120		4	Compound.....	110-140	5.00	Yes	
Wisconsin.			1-	Pop.	Babbitt.	Babbitt.	Water.	Bat.	6	425		K or G.	16	32		4	Shunt.....	40	0.60	No
Wisconsin.			1-4 1/2 x 5 1/2	Pop.	Babbitt.	Babbitt.	Water.	Bat.	6	400	Cent.	K or G	16	32	180	4	Shunt.....	42	0.84	No
Wisconsin.			1-3 1/2 x 4 1/2	Pop.	Babbitt.	Babbitt.	Water.	Bat.	6	450	Cent.	K or G	16	32	130	4	Shunt.....	40	0.60	No
Wisconsin.			1-5 1/2 x 6	Pop.	Babbitt.	Babbitt.	Water.	Bat.	6	340	Cent.	K or G	16	32	210	4	Shunt.....	40	1.08	No

Explanation of Abbreviations—  
Figures represent column numbers.

3 Pop—Poppet  
R-Sl—Rotary Sleeve

3 Sl—Sleeve  
5 B & R—Ball and Roller

# New Zealand Has Potential Market for 25,000 Cars

A report of the Bureau of Foreign and Domestic Commerce discusses the possibilities of American manufacturers continuing to hold the automotive trade of that Dominion in competition with British firms. Sales demands and requirements for the New Zealand trade are given herewith.

**W**ILL the United States hold the predominating automotive trade of New Zealand, which it has gained as a result of the war? That is an important question that American exporters must consider, according to reports received by the Bureau of Foreign and Domestic Commerce at Washington.

In 1914, the United States, with exports amounting to \$1,275,146, was second, the United Kingdom leading with a total of \$1,535,940 of automobile exports, in the New Zealand trade. In 1918, this country assumed first place, shipping 1897 vehicles valued at \$1,660,260.

New Zealand has approximately 25,599 automobiles and 14,713 motorcycles. These figures were reached by making a total of all the cars and motorcycles imported since 1912. Motor vehicles are registered but once in New Zealand and not each year, as in the United States; hence the number in operation may only be estimated. Following is a table showing the imports for the last seven years:

Year	Motor cars	Motorcycles	Year	Motor cars	Motorcycles
1912.....	2,261	2,665	1917.....	4,680	1,366
1913.....	2,724	2,619	1918.....	3,076	1,119
1914.....	3,119	2,500			
1915.....	3,589	2,170	Total	25,599	14,713
1916.....	6,150	2,274			

Taking 25,000 as the number of machines in use in New Zealand, approximately 8,000 are used for commercial purposes and the other 17,000 for pleasure. Owing to the high prices obtained for its primary products during the war, New Zealand is very prosperous and at least another 25,000 persons have sufficient incomes to purchase and maintain motor cars and another 10,000 have the necessary means to purchase and maintain motorcycles.

As the territory is a British possession, the tendency is to favor British manufactures. Until 1910 practically all automobiles were imported from the United Kingdom, but after that time American manufacturers sent an increasing number of cars and motorcycles and since 1914 the American product has practically controlled the market. The following table gives the number and value of motor cars and trucks imported in the years 1914 and 1918, by countries of origin:

Countries of Origin	1914		1918	
	Number	Value	Number	Value
United Kingdom...	921	\$1,535,940	14	\$21,617
Canada .....	864	482,640	1,161	479,316
Australia .....	...	...	1	3,752
France .....	57	163,514	1	667
Italy .....	10	3,142	2	1,906
United States .....	1,247	1,275,146	1,897	1,660,260
Belgium .....	5	7,904	...	...
Germany .....	15	9,972	...	...
Total .....	3,119	\$3,478,258	3,076	\$2,167,518

Automobiles are imported in large wooden cases lined with tar paper and are packed so that they can be easily assembled when landed.

The motorcycle business has developed since 1914, when eleven different makes were imported, eight of which were English and three American, with prices ranging from \$316 to \$632. During the war English motorcycles were difficult to obtain and business from the United States consequently increased. Light motorcycles are used in the flat districts, while the more powerful ones are desired in the hilly sections. Consequently low-powered cars are used only about Christchurch, South Island, and Palmerston North and Napier in the North Island, while high-powered vehicles are used in Auckland, Wellington and Dunedin. Following are the numbers and values of motorcycles in 1914 and 1918:

Countries of Origin	1914		1918	
	Number	Value	Number	Value
United Kingdom ...	2,296	\$145,995	124	\$32,882
United States .....	189	27,310	995	226,560
Australia .....	3	433	...	...
Belgium .....	8	1,070	...	...
France .....	1	443	...	...
Switzerland .....	3	360	...	...
Total .....	2,500	\$175,611	1,119	\$259,442

At present, practically all of the motorcycles imported are of American manufacture, chiefly because English makes are unprocurable or very expensive, but partly also because American motorcycles are well adapted to the hilly country in New Zealand. Side cars are popular, especially in Auckland, where 50 per cent of the machines are so equipped.

The only non-American automobile tires used are those of the Dunlop brand, made in Australia. The following table gives the value of imports of tires for motor vehicles other than motorcycles, by countries of origin, for the years 1914 and 1918:

Countries of Origin	1914	1918
United Kingdom ...	\$315,125	\$392,682
Canada .....	3,858	254,907
Australia .....	241,426	724,645
France .....	68,856	243,037
Italy .....	183,700	62,865
Japan .....	...	816
United States .....	124,879	1,736,844
Belgium .....	701	...
Germany .....	337,316	...
Netherlands .....	58	...
Russia .....	4,102	...
Switzerland .....	10	...
Total .....	\$1,280,031	\$3,415,796

Taxicab service has been developed throughout New Zealand, with 150 taxicabs in operation in Auckland, 90



per cent of the chauffeurs owning their own cars. Taxicabs in Auckland are required to have right-hand drives and a city ordinance is being considered there that would compel all automobiles to have right-hand drives.

### Sales Methods

Most of the garage proprietors in New Zealand are agents or subagents for one or more makes of automobiles, and most of them carry a fair stock of parts and accessories for the particular cars they represent. Complete stocks are generally carried only by the sole agents. Workshops are usually connected with the garages and parts are made that the dealer does not carry in stock. New parts for English cars are usually manufactured locally when needed.

Most of the motor cars sold in New Zealand are imported by sole agents who have their branches or subagents in the various centers. Some makes have one agent for the Auckland province and another for the rest of the Dominion, while others appoint agents in the four centers, Auckland, Wellington, Christchurch and Dunedin. The best method, however, is to appoint a good sole agent in Auckland or Wellington, with branches in other centers.

The sale of motor cars is not vigorously prosecuted as in the United States. No travelers are employed to canvass in the city or among farmers and practically all cars are sold by local agents or their assistants. The tendency is to let the machine sell itself.

Most cars imported are sold either before they are ordered or before they arrive in New Zealand, only a small number being sold from stock. The reason for this is that during the war it was difficult to get shipments forward rapidly enough to supply the demand. Importers sell motor vehicles at about 30 per cent above landed cost, which attracts many merchants into the business.

Over one-half of the motorcycles in the Dominion are used for pleasure. The terms of retail sale before the war were usually one-sixth cash and the balance payable at \$15 per month, but now machines are usually sold at strictly cash or one-half down and the balance at \$15 per month.

Most of the automobile advertising is placed with local newspapers by the sole or local agents, but there is a fair amount of advertising on the screens in motion-picture theaters, and a smaller amount on signboards and along highways and railroads. Printing is expensive in New Zealand and folders and pamphlets are usually printed by the manufacturers and furnished to dealers free of charge. The most effective way of advertising is through the local newspapers, weekly magazines and farm journals. Many popular American magazines are widely read by both farm and city residents of New Zealand, and automobile and motorcycle advertisements in these papers are effective.

### Trucks and Tractors

Practically all passenger automobiles are sold complete with body, tires and necessary tools, but truck chassis are imported separately and the bodies are made locally. The 1-ton truck has become popular in recent years owing to its ability to climb the hills and withstand the rough country roads but there is an increasing demand for six-cylinder and 2½-ton trucks. The 1-ton trucks are used chiefly for delivery purposes in the cities; nevertheless, an increasing number are used in the country districts. Many farmers are delivering milk to the creameries in 1-ton trucks.

Farm tractors are becoming popular owing to the scarcity of agricultural labor. Twenty-two tractors recently arrived at Auckland in one shipment from the United States. As a great many new farms are being

opened up, there will continue to be a good demand for motor tractors and American exporters are advised to exert themselves for this business.

Gasoline is expensive. The retail price in November, 1919, in the large centers was \$6.57 per case of ten American gallons, or 66 cents per gallon, and in the country districts, \$7.06 per case, or 71 cents per gallon. Lubricating oil sold at \$1.52 per imperial gallon, equal to about \$1.21 per American gallon. During the war until 1917 all gasoline was imported from the United States, but since that year small shipments have been coming forward from Java as well.

Automobiles and motorcycles are required to have a number plate front and rear, a horn, dim headlights, etc. As in other British countries, the left rule of the road and the right-hand drive is the custom in New Zealand, and although in Auckland the use of left drives is permissible, by-laws may at any time be made refusing a license to such cars.

Owners of motorcycles and automobiles in Auckland are required to pass an examination in driving to show that they are capable of operating their machines. For this license they are charged \$1.21 for a motorcycle and \$2.43 for an automobile. In addition, the owner must purchase two plates, costing \$1.52 for motorcycles and \$1.94 for automobiles, as well as pay a registration fee of \$1.21 for motorcycles and \$2.43 for motor vehicles. There are no national regulations pertaining to motorcycles and each city makes its own by-laws.

### Use of Electric Trucks Increasing

The number of electric trucks is increasing rapidly in Christchurch, where cheap power is obtained from the New Zealand governmental hydroelectric plant at Lake Coleridge, near that city. Several private charging stations have recently been installed and the Christchurch City Council has completed the erection and equipment of a charging garage capable of accommodating fifty vehicles. Another station is being erected at Rangiora, a suburb of Christchurch, under the supervision of the Christchurch Electrical Department, for charging electrically driven delivery vans in that community. The department intends to erect other charging stations at Little River, Leeston, Rakaia and other places where current from the Lake Coleridge plant is available.

Electric passenger automobiles are not extensively used, there being only two or three at Christchurch. It is reported that the purchase and upkeep is as yet too expensive. There is an excellent opening for the introduction of electric vehicles in Christchurch, it is reported, and the city engineer is doing everything he can to encourage their use for commercial and other purposes.

When American and English automobiles of equal value and price are being considered, the New Zealander will invariably purchase the English car, but aside from this, there is little prejudice against American automobiles. The outlook for the sale of American motor vehicles in New Zealand is promising. This is chiefly because, during the war, owners became attached to the strong qualities of the American car, such as lightness, durability, low cost of operation combined with high power, as compared with the more solid English car. The American car is better adapted to the steep hills so characteristic of many parts of New Zealand.

Considering that the sale of automobiles is not vigorously pushed and at least another 25,000 persons are in a position to purchase and maintain automobiles and 10,000 to buy motorcycles, the American manufacturer should go after this business before other makes establish their after-war models on the New Zealand market.

# Standardized Practice for American Export Quotations

Foreign trade bodies determine upon recommendations for standardized American practice. The recommendations are explained here in detail so that shippers may reach an understanding on these difficult points.

**I**N an effort to clarify the many mistaken meanings that frequently have mystified the American exporter, a recent conference of trade organizations adopted a series of definitions of shipping quotations and made general recommendations for the standardization of such practice. The associations were the National Foreign Trade Council, the Chamber of Commerce of the United States, the National Association of Manufacturers, the American Manufacturers' Export Association, the Philadelphia Commercial Museum, the American Exporters and Importers' Association, the Chamber of Commerce of the State of New York, the New York Produce Exchange and the New York Merchants Association.

Excerpts from their definitions are given herewith in the hope that their use may become general among exporters of automotive equipment, thus eliminating confusions and misunderstandings between the American shipper and the foreign buyer. Commercial students in other countries have pointed out frequently the harm done to trade by such mistakes and it is considered imperative, in order that the export trade of this country may be kept flourishing, that some general understanding should be reached on these rather difficult points. The definitions follow:

1. When the price quoted applies only at inland shipping point and the seller merely undertakes to load the goods on or in cars or lighters furnished by the railroad company serving the industry, or most conveniently located to the industry, without other designation as to routing, the proper term is:

"F. O. B. (named point)"

Under this quotation:

#### A. Seller must

- (1) place goods on or in cars or lighters
- (2) secure railroad bill of lading
- (3) be responsible for loss and/or damage until goods have been placed in or on cars or lighters at forwarding point, and clean bill of lading has been furnished by the railroad company.

#### B. Buyer must

- (1) be responsible for loss and/or damage incurred thereafter
- (2) pay all transportation charges including taxes, if any
- (3) handle all subsequent movement of the goods.

2. When the seller quotes a price including transportation charges to the port of exportation without assuming responsibility for the goods after obtaining a clean bill of lading at point of origin, the proper term is:

"F. O. B. (named point) Freight Prepaid to (named point on the seaboard)"

Under this quotation:

#### A. Seller must

- (1) place goods on or in cars or lighters

- (2) secure railroad bill of lading
- (3) pay freight to named port
- (4) be responsible for loss and/or damage until goods have been placed in or on cars or lighters at forwarding point, and clean bill of lading has been furnished by the railroad company

#### B. Buyer must

- (1) be responsible for loss and/or damage incurred thereafter
- (2) handle all subsequent movement of the goods
- (3) unload goods from cars
- (4) transport goods to vessels
- (5) pay all demurrage and/or storage charges
- (6) arrange for storage in warehouse or on wharf where necessary

3. Where the seller wishes to quote a price, from which the buyer may deduct the cost of transportation to a given point on the seaboard, without the seller assuming responsibility for the goods after obtaining a clean bill of lading at point of origin, the proper term is:

"F. O. B. (named point) Freight Allowed to (named point on the seaboard)"

Under this quotation:

#### A. Seller must

- (1) place goods on or in cars or lighters
- (2) secure railroad bill of lading
- (3) be responsible for loss and/or damage until goods have been placed in or on cars or lighters at forwarding point, and clean bill of lading has been furnished by the railroad company

#### B. Buyer must

- (1) be responsible for loss and/or damage incurred thereafter
- (2) pay all transportation charges (buyer is then entitled to deduct from the amount of the invoice the freight paid from primary point to named port)
- (3) handle all subsequent movement of the goods
- (4) unload goods from cars
- (5) transport goods to vessel
- (6) pay all demurrage and/or storage charges
- (7) arrange for storage in warehouse or on wharf where necessary

4. The seller may desire to quote a price covering the transportation of the goods to seaboard, assuming responsibility for loss and/or damage up to that point. In this case the proper term is:

"F. O. B. Cars (named point on seaboard)"

Under this quotation:

#### A. Seller must

- (1) place goods on or in cars
- (2) secure railroad bill of lading
- (3) pay all freight charges from forwarding point to port on seaboard



- (4) be responsible for loss and/or damage until goods have arrived in or on cars at the named port

## B. Buyer must

- (1) be responsible for loss and/or damage incurred thereafter
- (2) unload goods from cars
- (3) handle all subsequent movement of the goods
- (4) transport goods to vessel
- (5) pay all demurrage and/or storage charges
- (6) arrange for storage in warehouse or on wharf where necessary

5. It may be that the goods, on which a price is quoted covering the transportation of the goods to the seaboard, constitute less than a carload lot. In this case, the proper term is:

"F. O. B. Cars (named port) L. C. L."

Under this quotation:

## A. Seller must

- (1) deliver goods to the initial carrier
- (2) secure railroad bill of lading
- (3) pay all freight charges from forwarding point to port on seaboard
- (4) be responsible for loss and/or damage until goods have arrived on cars at the named port

## B. Buyer must

- (1) be responsible for loss and/or damage incurred thereafter
- (2) handle all subsequent movement of the goods
- (3) accept goods from the carrier
- (4) transport goods to vessel
- (5) pay all storage charges
- (6) arrange for storage in warehouse or on wharf where necessary

6. Seller may quote a price which will include the expense of transportation of the goods by rail to the seaboard, including lighterage. In this case the proper term is:

"F. O. B. Cars (named port) Lighterage Free"

Under this quotation:

## A. Seller must

- (1) place goods on or in cars
- (2) secure railroad bill of lading
- (3) pay all transportation charges to, including lighterage at, the port named
- (4) be responsible for loss and/or damage until goods have arrived on cars at the named port

## B. Buyer must

- (1) be responsible for loss and/or damage incurred thereafter
- (2) handle all subsequent movement of the goods
- (3) take out the insurance necessary to the safety of the goods after arrival on the cars
- (4) pay the cost of hoisting goods into vessel where weight of goods is too great for ship's tackle
- (5) pay all demurrage and other charges, except lighterage charges

7. The seller may desire to quote a price covering delivery of the goods alongside overseas vessel and within reach of its loading tackle. In this case the proper term is:

"F. A. S. vessel (named port)"

Under this quotation:

## A. Seller must

- (1) transport goods to seaboard
- (2) store goods in warehouse or on wharf if necessary, unless buyer's obligation includes provision of shipping facilities
- (3) place goods alongside vessel either in a lighter or on the wharf

- (4) be responsible for loss and/or damage until goods have been delivered alongside the ship or on wharf

## B. Buyer must

- (1) be responsible for loss and/or damage thereafter, and for insurance
- (2) handle all subsequent movement of the goods
- (3) pay cost of hoisting goods into vessel where weight of goods is too great for ship's tackle

8. The seller may desire to quote a price covering all expenses up to and including delivery of the goods upon the overseas vessel at a named port. In this case the proper term is:

"F. O. B. vessel (named port)"

Under this quotation:

## A. Seller must

- (1) meet all charges incurred in placing goods actually on board the vessel
- (2) be responsible for all loss and/or damage until goods have been placed on board the vessel

## B. Buyer must

- (1) be responsible for loss and/or damage thereafter
- (2) handle all subsequent movement of the goods

9. The seller may be ready to go farther than the delivery of his goods upon the overseas vessel and be willing to pay transportation to a foreign point of delivery. In this case the proper term is:

"C & F. (named foreign port)"

Under this quotation:

## A. Seller must

- (1) make freight contract and pay transportation charges sufficient to carry goods to agreed destination
- (2) deliver to buyer or his agent proper bills of lading to the agreed destination
- (3) be responsible for loss and/or damage until goods have been delivered alongside the ship and clean ocean bill of lading obtained (seller is not responsible for delivery of goods at destination)

## B. Buyer must

- (1) be responsible for loss and/or damage thereafter and must take out all necessary insurance
- (2) handle all subsequent movement of the goods
- (3) take delivery and pay costs of discharge, lighterage and landing at foreign port of destination in accordance with bill of lading clauses
- (4) pay foreign customs duties and wharfage charges, if any

10. The seller may desire to quote a price covering the cost of the goods, the marine insurance on the goods, and all transportation charges to the foreign point of delivery. In this case the proper term is:

"C. I. F. (named foreign port)"

Under this quotation:

## A. Seller must

- (1) make freight contract and pay freight charges sufficient to carry goods to agreed destination
- (2) take out and pay for necessary marine insurance
- (3) be responsible for loss and/or damage until goods have been delivered alongside the ship, and clean ocean bill of lading and insurance policy have been delivered to the buyer, or his agent. (Seller is not responsible for the delivery of goods at destination, nor for payment by the underwriters of insurance claims)
- (4) provide war risk insurance, where necessary, for buyer's account

## B. Buyer must

- (1) be responsible for loss and/or damage thereafter, and must make all claims to which he may be entitled under the insurance directly on the underwriters
- (2) take delivery and pay costs of discharge, lightering and landing at foreign port of destination in accordance with bill of lading clauses.
- (3) pay foreign customs duties and wharfage charges, if any

## EXPLANATIONS OF ABBREVIATIONS

F. O. B.....	Free on board
F. A. S.....	Free alongside ship
C. & F.....	Cost and freight
C. I. F.....	Cost, insurance and freight
L. C. L.....	Less than carload lot

The chief purpose of the conference was to simplify and standardize American practice. To that end it urged

manufacturers and exporters to cease the use of synonymous abbreviations and quote habitually in the terms here recommended, just as far as these terms will cover the price conditions which it is desired to arranged with the buyer. In simplified and standardized practice lies the best hope of reducing confusion and avoiding controversy.

The conference urged upon manufacturers and exporters the great importance of making their intention in whatever quotations they employ so thoroughly clear as to be impossible of misunderstanding or misinterpretation. It is much better to take the time and space at the outset to make the quotation clearly understood, than to be compelled in the end to go through vexatious controversy or litigation, which costs not only time and expense but customers as well. Misunderstandings can best be avoided if the seller will formulate a written statement of the general conditions under which his sales are to be made, and will see that the foreign buyer possesses these terms of sale when considering a quotation.

## French Standardization of Solid Tire Sizes

UP to the present, there have been 64 sizes of solid rubber tires in common use in France, from the 800 x 85 to the 1030 x 180 mm., besides a large number of sizes for which there is a limited demand. As the use of so many sizes involves the tying up of a great amount of capital and unnecessary waste, the Solid Tire Manufacturers' Section of the Rubber Industries Syndicate (of France) has been endeavoring to standardize these tires. Three dimensions have been standardized, namely, the inside diameter of the base band, the width and the height of the tire section. As shown by the accompanying table there will be 4 inside diameters of base bands, each suitable for a number of different tire widths. The list of proposed sizes with their capacities is as follows:

STANDARD SOLID TIRE DIMENSIONS (MM.)					
Inside Dia. of Base Band	Section of Tire				
	100	120	140	160	180
720.....	870	900	900	900	...
770.....	920	930	950	970	970
850.....	1000	1010	1000	1030	1030
1000.....	1140	1160	....	....	....

LOAD LIMITS PER AXLE FOR SINGLE SOLID TIRES (IN KG.)					
Class of Wheel	Section of Tire				
	100	120	140	160	180
Steering..	1680	2400	3200	4000	4500
Driving ..	1400	2000	2700	3350	3750

Standardization of wheel rim diameters is intimately connected with that of base bands. It was therefore necessary to fix upon a force fit allowance which would determine the diameter of the rims. Different coefficients were suggested by members of the association and on the basis of these suggestions the committee studied the problem. It is the general practice to make a certain allowance between the inside circumference of the base band and the outside circumference of the rim.

It was concluded that a difference of 0.6 mm. on the diameters, or 1.8849 mm. on the circumferences of the wheel rim and base band respectively, is sufficient for insuring proper adherence between the rim and base band. According to the Maison Hutchinson (a French solid tire manufacturing firm) this difference is fixed for American tires and has the value of 3.53 mm. The British tolerances are such that the minimum difference is 2 and the maximum 5 mm.

The British, in September, 1917, revised their solid tire sizes and agreed on four standard base band diameters and

two supplementary sizes that are in extensive use but that are to be discontinued later. These two supplementary sizes are indicated by an asterisk in the following table:

Auto Dia. of Rim	Limits of Outer Circumference of Rim		Limits of Inner Circumference of Base Band	
	Minimum	Maximum	Maximum	Minimum
670.....	2104.9	2105.9	2102.9	2100.9
720.....	2262	2263	2260	2258
741.....	2327.9	2325.9	2325.9	2323.9
771.....	2422.2	2423.2	2420.2	2415.2
850.....	2670.3	2671.3	2668.3	2666.3
881.....	2767.7	2768.7	2765.7	2763.7

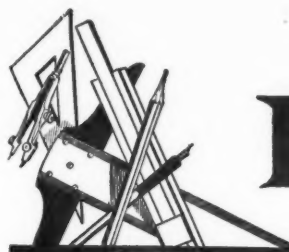
An analysis of the above table will show that the minimum allowance is 2 mm. and the maximum 5 mm. The French manufacturers expect to adopt exactly the same dimensions and tolerances, only they have an additional size, 1000 mm. in diameter.

For forcing the base band over the wheel rim, the latter is provided with a chamfer on one side measuring 10 mm. laterally and 3 mm. radially. When the base band is placed on the rim, it is, of course, entirely beyond the chamfered portion.

The French organization states that the dimensions and tolerances proposed will make French solid tires interchangeable with British and American solid tires on the same rims. These dimensions remain to be approved by the automobile manufacturers associations of France, Great Britain and the United States.

An attempt is made to calculate the friction between the base band and rim and the pressure that must be exerted on the base band to force it laterally over the rim. Taking the largest width of tire, 180 mm., and a rim diameter of 770 mm., the inside radius of the base band is 385 mm., its width 180 mm. and its thickness 11 mm. The base band with tire is forced over the rim, which is turned down to a slightly greater diameter, about 0.6 mm., by means of an hydraulic press. The pressure thus exerted creates a tension in the band, which in turn causes a friction between the surfaces in contact, this friction being sufficient to prevent any angular displacement of the base band on the rim. It is calculated that the pressure between the base band and rim for the dimensions given is 41 tons. Unfortunately, this pressure decreases in use, which is due to the wear caused by demounting and remounting the tires.





# The FORUM



## Proper Location of Camshaft Driving Gears

Editor AUTOMOTIVE INDUSTRIES:

I was interested in reading the report of the December meeting of the Metropolitan Section of the Society of Automotive Engineers on "Torsional Vibration in Crankshafts." My purpose in writing you is, in view of the inference by means of the sentence following my remarks, that my face had never been seen in a repair shop.

Upon further consideration I feel more convinced than ever that the best way of driving a cam shaft on a large engine of the type discussed is from the flywheel end of the crankshaft. The nearer one can drive from the point at which the node exists the more durable will be the drive. It is folly to attempt to drive from the light free end of a crankshaft where the "loop" exists. While the node does not exist immediately in front of the flywheel this point is, however, far superior to the other end of the shaft.

Since making my remark in the discussion I was advised by Mr. Fox that all the German submarine engines were driven in the manner which I advocated, and this will be verified when the S. A. E. members inspect one of these engines next Thursday in Philadelphia.

If a device is a source of trouble, it must naturally be accessible. The need for accessibility becomes less as the device becomes more reliable. There is no reason why a properly designed set of gears located at the flywheel end should not have a long life, due to the even angular drive at this point. They should not require attention until the general overhaul is in order. It is a matter of design, which in itself is simple, to give this construction almost the accessibility of the present drive.

Inasmuch as marine engineers have drawn considerably on the automobile field for some of their inspirations, it is foolish to copy blindly designs in which the difference in duty of the two types of engines will nullify a certain construction. Many of us are too prone to reverence old construction and traditions.

AUSTIN M. WOLF.

## Variation of Power with Speed in Tractor Plowing

Editor AUTOMOTIVE INDUSTRIES:

We notice that one or two business publications have recently published Prof. J. B. Davidson's paper on the "Influence of Speed on the Draft of Plows," which was read before a meeting of the American Society of Agricultural Engineers, but have apparently failed to distinguish between pounds pull and power developed, inasmuch as, in one case, the paper has been said to "prove the great advantages of higher plowing speeds."

We do not know whether you have any intention of publishing this paper, but if so it is hoped that you may see your way clear to have it accompanied by an editorial note calling the reader's attention to the real facts brought out by Professor Davidson's investigation, namely: that increasing the speed of the plow increases the draft,

hence, the power required to pull plows increases out of proportion to the speed. Professor Davidson's figures showed an increase of from 16 to 25 per cent in the pounds pull from doubling the speed. He was addressing a group of engineers and apparently assumed that he need not call their attention to the fact that doubling the speed also doubled the power required, and that, in addition to this doubled power, there was 25 per cent more power required, due to the increase in the draft of the plow because of the higher speed.

In the past, as you doubtless know, it has been a rather common practice to assume that doubling the speed of a plow simply doubled the horsepower required to pull it. This assumption has been due to the fact that there has been no accurate information available as to the effect of speed on the draft. Professor Davidson's investigations show that doubling the speed more than doubles the horsepower required, due to the increase in draft at the higher speeds.

His findings, therefore, instead of being favorable to higher speed plowing, are really condemnatory, inasmuch as they show that there is a waste of energy at the higher speeds. Furthermore, his investigations considered only the waste of energy at the plow and did not take into consideration the waste due to the higher speed of the tractor, additional travel over the ground, extra turning at the ends, greater wear and tear due to the increased travel of moving parts of the tractor and from the fact that the impact of the tractor against obstacles increases with the square of the speed.

INTERNATIONAL HARVESTER CO. OF AMERICA,  
By Arnold P. Yerkes.

## Book Review

**MOTOR Truck Design and Construction.** By C. T. Schaefer, published by D. Van Nostrand Co., New York, \$2.50.

The author presents a book that deals with the subject of motor trucks chiefly from the standpoint of the engineer designing assembled trucks, it would seem. Every part of the truck except the body is discussed, but the treatment in the case of the major units, such as the engine, transmission, etc., is not sufficiently detailed to be of much help to designers of such components. In fact, no rules for the dimensioning of any of the parts are given, and the treatment may be said to be qualitative rather than quantitative. On the other hand, the book presents such a general discussion of the different types of engine, transmission, axle, etc., as might meet the requirements of the engineer of an assembling concern. Numerous drawings, chiefly sectional views, are used to illustrate the text, showing truck components, including engines, carbureters, radiators, clutches, transmissions, universal joints, differentials, rear axles, axle linkages, brakes, front axles, steering gears, frames, power plant mountings, springs, fuel supply systems, controls, mufflers, wheels, rims and tires. This extensive collection of samples of design is probably the most valuable feature of the book.

# The Political Future of Labor and Industry

The announcement that the American Federation of Labor and other bodies will use their strengths to force economic questions into the coming campaigns, by advising their members concerning various candidates, is taken by Mr. Tipper as his theme for this article. He urges an awakened spirit to meet this threat.

By Harry Tipper

IN considering the general labor question, it is impossible to avoid taking into account the social questions which have arisen and are likely to arise, and the political attitude. In fact, the question of the character of the industrial system is so intimately connected with the social questions which have been brought to the front and the political theories and platforms of various parties, either directly affiliated with labor or concerned entirely with economic changes, that no true picture of present conditions can be drawn without an examination of these matters.

From time to time, in the earlier part of this series of articles, we stated that the decision of the American Federation of Labor to refrain from projecting a political party did not signify that this organization would keep out of politics. In fact, we made the definite statement that they would interfere in the political arena more and more and influence the parties bidding for votes to include economic platforms to a larger and larger degree.

It is to be noted that the American Federation of Labor has now indicated its intention of advising its members to vote for or against candidates for office, largely upon their attitude on labor questions. This means that the American Federation of Labor is in politics with both feet and has decided to use the strength of its organization to force economic questions into the political arena.

That branch of the Socialist party which believes in acquiring Socialism by moral suasion and the action of the ballot is bent upon turning governmental questions entirely upon economic theories, while the Communist party, the Revolutionary Socialist and similar bodies are out to secure an economic form of government by any means whatsoever, whether peaceful or warlike. The revolutionary bodies claim an adherence of 500,000, the American Federation of Labor claims a membership of 4,000,000. All together the various parties who are concerned with politics only to the extent that they can turn it into the settlement of economic questions claim a total of 6,000,000 adherents out of this country's citizenship. The question of their exact proportion is not of great importance.

The real point to be considered is the effect of this constant pressure of organized propaganda upon the candidates for office. The previous actions of Congress in the presence of organized propaganda, even from a small minority of the population, indicate the ease with which the legal structure can be changed by regulations where the propaganda to that end is well organized and constant.

It is assumed, apparently, that because there is a considerable volume of organized pressure in favor of enlargements of the governmental economic program and no constant and voluminous organized protest against such actions, the majority are either in favor of such developments or indifferent to them. It is further assumed that this supposed majority sentiment is sufficient justification for any governmental action, no matter how much it may depart from the traditional methods and no matter what new principles of governmental activities it may involve. This assumption that the majority sentiment justifies an action without any other justification being required, is in itself the most serious departure from the traditional views of governmental function, and in connection with the increased activity of all the parties who aim to turn the attention of government to economic regulations is likely to have an effect upon the older political parties which may have far-reaching results from an industrial standpoint.

It is evident that the Railroad Brotherhoods have not forgotten the Plumb Plan, that the organization of coal miners are still interested in the nationalization of mines, and that the American Federation of Labor is not inclined to forego any of the advantages it has lately secured and is very much concerned with the development of these advantages by new legislation.

These various currents which have become more definite in their propaganda and more persistent in their efforts would not be of great importance if the large body of opinion in this country was decently educated and reasonably articulate in its political expression. It has been stated many times in these articles that the worker knows little or nothing of industrial organization and little or nothing of the interdependence of modern civilization. For different reasons this is none the less true of the farmers and the middle class.

Not only is this the case, but there is so little understanding of the significance of political action that even industrial groups and industrial leaders, who should be aware of the dangerous tendencies in such matters, have clamored for governmental enforcement and regulation when their own immediate requirements seemed to demand it for temporary relief or protection. Already, social questions and economic ideas have been turned into regulations by Federal laws because of the insistence of one group of interest and the indifference of the rest of the parties to the dangerous tendency involved in such regulations.

Already the right of the individual to exercise his judgment upon questions of personal character have



been foregone in the action of state legislators and Congressional bodies; similarly, the rights of the investor to a fair return upon his investment have been questioned and, in at least one notable instance, the property of a great industry has been destroyed without adequate compensation. It is because of these tendencies already established that the action of the American Federation of Labor, in deciding to put the strength of its organization into the ballot, presents many interesting elements of speculation and many possibilities of development in the platforms of all political parties. It is because of this that the propaganda of the Socialistic parties needs examination and watching.

The practice of the Government already established to disregard personal rights of the individual in certain matters, to ignore the traditional rights of the investor and the traditional rights of industrial establishments means that the way has been opened by established precedents for the enlargement of the economic program in politics in any direction, where sufficient pressure is excited upon the law-making body. The most astonishing thing about this whole matter is the apparent indifference of industry to the currents of politics on these social and economic questions.

Although the whole of industrial prosperity in this country depends upon the rapid development of transportation by railroad, by the electrical road, by the waterway and by the highway, no sound suggestions of procedures have come from the great industrial groups during the hearings upon the railroad bills and, from all that can be learned, no adequate pressure has been brought upon the Congressional body to deal with the subject in a practical way so that the better facilities can be secured to meet the growing demands of industry. Although the highways are becoming more and more important for the transportation of goods, few industries have concerned themselves with the matter and the present condition, lack of standardization, confusion of licensing laws and other items of legislation indicate a lack of any decent knowledge of the subject on the part of the law-making bodies.

One of the things disclosed by Federal inquiries to the industrial establishments about labor troubles during the war, was the fact that most concerns figured they had no trouble if they did not have a strike. It looks as though industry had the same attitude of mind toward Congress and Federal action. If the textile men felt that a law which was to be enacted would disturb them, they might protest, and similarly with other industrial groups. In few industries has there been any recognition of the fact that constructive legislation in

regard to all public utilities was necessary for all industry and that any tendency to disregard the traditional rights of the investor or the operator in any industry was equally dangerous to all other industries. If the majority of the workers thought as they feel there would be little opportunity for foolish experimentation in the name of reform or for wiping out old principles of government in the interests of the temporary expediency. But the public do not think as they feel and, in any case, feelings are not friendly toward capital and are indifferent to anything that does not touch their immediate surroundings and interests.

It is not likely that this country immediately will develop a political program of a radical economic character, but it is extremely probable that steps will be taken each year in the action of the Congressional body which will definitely establish, bit by bit, an economic program that will have distinctly radical tendencies. This is the danger, because it is very likely that industry will continue to be indifferent to these slight steps, under the impression that they do not make any material difference at the moment.

In fact, it is not the revolutionary program of the Communist Party which is dangerous, because that program means revolution, and comparatively few people want warfare. Such a program is only effective as it is written for the purpose of agitation so that it stimulates unrest and keeps it alive.

It is the pressure which can be exerted by bodies like the American Federation of Labor (practical, conservative and patient in acquiring its object) which is more significant. The effect of pressure of this kind will only be felt gradually, and by the development of regulation which does not seem to be of great importance, but which established the precedent that will serve as foundation for the succeeding steps in the more Socialistic program to follow.

The public will be indifferent in the meantime to such measures because none of them immediately will disturb the necessities or surroundings of the individual. Labor will, of course, continue to exert its pressure and, unless industry loses its indifference and becomes interested in constructive measures, unless business men concern themselves with education, unless they are prepared to recognize every invasion of industrial rights as an invasion of their particular rights, the general tendency to more and more regulation in economic matters will have established itself in a complete economic program before they are aware of its progress and the significance of its development.

## Aluminum Alloy for Automotive Trades

**T**HERE is an increasing demand for a white metal as light as aluminum and possessing good tensile strength and a high elongation. To meet this demand, a number of products have been brought forward, among which may be mentioned an alloy of aluminum known as Verilite. Its gravity is about 2.75.

By using magnesium, a strong alloy can be made that is lighter than aluminum, but this is not recommended by the manufacturers, as it cannot be remelted readily in the average foundry. Verilite is said to pass through the melting process without deterioration and with but little loss. The shrinkage is 0.15 in. per foot, which is somewhat less than that of aluminum.

A tensile strength of 20,000 to 24,000 lb. per sq. in. is

claimed for castings and the producers say that for ordinary uses these figures are preferable to higher strength gained at the expense of toughness. The rolled material is said to show from 50,000 to 55,000 lb. per sq. in. ultimate strength, with from 5 to 15 per cent elongation in 2 in.

This metal is intended for a wide variety of uses, including ball bearing retainers, crank, gear and transmission cases, and numerous other parts of automobiles, power boats and airplanes.

**E.** S. GOOD, a British expert on steel trade, writing in the *Yorkshire Observer*, estimates that non-producing countries are to-day in need of 70,000,000 tons of steel.

# AUTOMOTIVE INDUSTRIES

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## Commercial Airplane Development

PERHAPS the greatest need for the development of aviation in the United States is, first, the development of initiative on the part of airplane manufacturers. There are too many requests for Government assistance; and too many demands to get widespread publicity and to use sideshow methods.

From the recent Aeronautical Exposition in Chicago came the announcement that several hundred planes had been sold by one company. It is now reported by good authority that the sale was merely the taking of a future order with provisions in it by the company from its agent who, it appears, was without a single order for any of the planes at the time he made the contract. Likewise, none of the planes has yet been manufactured.

The Air Mail Service stands ready at all times to turn over established routes to reputable concerns, who will carry the mails under contract plans similar to those used by motor truck mail carriers. The oil fields in Oklahoma and Texas, where transportation facilities are poor and vast projects are dependent

on speed, offer great opportunities to aerial transportation enterprises. Likewise, there are numerous other opportunities in this country which could be well used by manufacturers who would organize subsidiary aerial transport companies for the development of aviation on a sound, substantial basis.

## The Truck Industry's Future

AMAZING possibilities confront the industry in the truck field if the development of the pneumatic-tired truck is carried as far as some of the more optimistic are predicting. Departures from existing practice in numerous directions are foreshadowed. For instance, the new aluminum alloys, which are suitable for axles and frames, may permit of cutting down dead weight to an unprecedented degree. The billion dollar hard surface road campaign is another factor. The shortage of freight cars is another, and so are the prices paid for garden and farm products. In fact, it does not seem at all visionary to state that we are entering a new era of transportation, and the pneumatic-tired truck will provide the means of solving a great percentage of the problems.

Freight cars at the present time are going to pieces more rapidly than they can be replaced and, as a result, goods and materials sorely needed elsewhere, are piling up in different parts of the country. The West Coast, for instance, cannot move its lumber for want of freight cars. In the Middle West, houses for workers cannot be built because of the scarcity and high prices of lumber. Factories are compelled to "drive-away" their finished cars to their destinations or to points where the opportunities for securing freight cars are better.

The quickest and surest method of relief is the use of the truck for short haul work, thus releasing the freight cars for longer hauls. During the war this method was enforced to a considerable degree and it worked well as a relief of the car situation. Regardless, however, of whether this method is enforced or not, the use of the pneumatic truck for short and medium hauls is going to grow rapidly.

The pneumatic tire increases the average speed of the truck from 12 to 20 m.p.h. and consequently permits of a greater number of trips or a greater distance per day. This in a great many undertakings with trucks means the difference between loss and profit. The practicability of pneumatics on trucks of 2-ton capacity and less has been demonstrated beyond doubt. When it comes to fitting pneumatics to trucks of over 2 tons, however, a great amount of study is required so that a wrong start may be avoided.

In the first place, it is quite evident that simply placing pneumatic tires on a truck designed for solid tires will not solve the problem. Experience has shown that this plan leads to over-stressing of the engine and makes a vehicle that is entirely out of balance. Then the problem arises of fitting the truck to the work in hand. There is considerable doubt whether a simple capacity rating meets the requirements. Transportation engineering, or the study of developing and selling the particular truck for the



particular job, plays a far more important part.

With trucks as they have been built in the past, the governed engine speed being low, a truck has practically the same capacity limit no matter where it is used, unless conditions are extreme. On the other hand, with pneumatic-tired trucks, if the roads to be travelled are smooth and the loads uniform, it may be possible to use a much lighter vehicle to carry a given load. A truck is supposed to handle its rated load under the most adverse circumstances. A man who is going to carry 3 tons over a road that is practically a boulevard may be able to use a truck with pneumatic tires built considerably lighter than the usual 3-ton truck. By careful study and analysis he may be able to increase considerably the ratio of his pay load to the total load.

This is borne out by the results obtained in the experiments on the Akron-Boston trucks. These trips were made over good roads. The initial trucks had a pay load of 7000 lb. as compared with a chassis and body weight of 15,800 lb. The latest trucks have a pay load of 7000 lbs. as compared with a chassis and body weight of 8000 lb.

## Vacuum Feed Under Wide Open Throttle

AS is generally known, in the vacuum fuel feed system, the fuel is lifted from the rear tank to the auxiliary tank by the vacuum existing in the inlet manifold. With ordinary carbureters, the vacuum or depression in the intake manifold with a wide open throttle will drop down to from 1 to 2 in. of mercury. A vacuum of 1 in. of mercury will lift gasoline only about 17 in. and, with the ordinary construction of rear tank mounted below the frame, it requires a lift of from 35 to 40 in., so it will be seen that with wide open throttle the vacuum is not sufficient to raise the fuel for taking care of the motor. Therefore, the vacuum system as generally fitted is not well suited to racing cars and other cars operated under similar conditions.

In average town work and in touring no difficulty is experienced, as it is seldom that the throttle is left wide open for a distance of more than 8 or 10 miles. This would be taken care of by the reserve supply of gasoline in reservoir on the vacuum tank.

It is claimed for the vacuum system that it often has saved bearings of high power automobiles in cases where drivers are inclined to maintain high speed continuously. There are few passenger car engines that will stand wide open throttle operation continuously for any length of time. As the vacuum system limits the length of time that the engine can be so operated without interruption, it is believed that a good deal of bearing trouble is prevented by it.

Some car manufacturers have been using a rather small vacuum tank, probably because these tanks can be bought more cheaply, and in such cars trouble is occasionally experienced in ascending long grades in mountainous districts when the reserve tank will run dry. American drivers are inclined to do practically all of their driving on high gear and this is one of

the factors responsible for the trouble; if they would use the lower gears a little more, the vacuum in the inlet manifold would be maintained better and the vacuum tank would not be emptied.

It has been found that, by the use of a small sensitive check valve located in the vacuum line which extends from the intake manifold to the vacuum tank, the vacuum feed can be successfully used on any wide open throttle engine. The action of this check valve is to take care of the intermittent vacuum in the manifold.

If a vacuum gage were placed on the manifold a wide fluctuation in the vacuum registered would be observed. A sensitive check valve overcomes this fluctuation and maintains a high vacuum in the line to the vacuum tank. In England, where there are a great many cars with small engines that operate at nearly full throttle most of the time, this check valve is extensively used in connection with the vacuum feed system.

## The Summer Meeting

AT present it appears very much as though the summer meeting of the Society of Automotive Engineers again would be held at Ottawa Beach, Mich. A strong sentiment in favor of this place has been expressed by the membership and the only question now is whether accommodations can be secured.

In selecting a place in which to hold the summer meeting, consideration must be given to the fact that the membership expects this meeting to be devoted as much to recreation as to professional work. Much opportunity for technical discussion is now afforded by the many events during the winter—the annual meeting, the tractor, aircraft and motor boat meetings and the monthly meetings of the sections. While a Standards Committee meeting is held during the summer meeting and a number of technical papers are read, the predominant note is that of sociability and recreation. At this meeting, more than at any other, the members have the opportunity of extending their acquaintanceship in the Society. Lectures on automotive subjects of a non-technical nature, illustrated by lantern slides and moving pictures if possible, are a desirable feature, and the sports also are enjoyed by large throngs each year.

In view of such considerations the meeting must be held at some resort, rather than in a city, and a shore resort offers many advantages over an inland place. As the attendance this year will probably fall not far short of 1000, the choice is quite limited, as there are comparatively few resorts of a suitable character that can accommodate such a number. It has been the custom to hold the summer meeting in the Middle West, conveniently accessible to a large body of members in Michigan, Illinois, Indiana and Ohio. As the annual meeting is always held at New York it is felt that members located in the West should have first say in regard to the summer meeting, and the majority would choose a Western point.

Ottawa Beach last year proved a desirable location. The meeting was probably more enjoyable than any previous summer one held on land.

## Makers Warned to Prepare for Competition in Argentina

**Buenos Aires Distributer Here to Purchase \$1,000,000 Worth of Cars  
Predicts Strong Year in 1920—Aggressive European  
Campaign Expected**

NEW YORK, Feb. 17—Exceedingly wet conditions, practically equivalent to floods, in some of the agricultural portions of Argentina during the months of September, October and November, 1919, practically stopped all motor car sales in that area. A portion of the Province of Buenos Aires, which is one of the best agricultural districts of Argentina, was incorporated in this flooded area. This fact, together with the exceedingly upset conditions in January, February and March of 1919, has made the year of 1919 not one of the best, so far as automobile business in Argentina, is concerned.

The year of 1919 opened inauspiciously with shooting affrays and mob rule in the State of Buenos Aires in January. This was followed by what amounted to practically a closing of the port of Argentina for practically several months, which prevented direct shipments.

General conditions are good, money is plentiful, and there are strong hopes for a good year in 1920. Harvesting is just being completed. The confidence that Argentines have in the future of the automobile industry in the country is well exemplified by the arrival in this city recently of E. Rochette, manager of the automobile business of P. A. Hardcastle of Buenos Aires, distributer for Willys-Overland, who brought with him a letter of credit equivalent to \$1,000,000 in U. S. A. currency, for the purchase of automobiles covering the current year. The Overland organization has approximately eighty distributors and dealers throughout the country and ranks second to Ford in sales. Mr. Rochette estimates that at present there are nearly 30,000 automobiles in Argentina, of which 15,000 are Fords. The Ford assembly is going on at about 40 cars per day.

### European Agents Busy

Mr. Rochette cautions U. S. A. automobile manufacturers to look to their laurels in holding the automobile trade in Argentina in the next three or four years. Up to this time there has not been any activity of European automobile concerns in Argentina by way of cars reaching that country. The factory representatives have all been in Argentina arranging for agencies, but first deliveries of some of Europe's largest producers have not been promised before April of this year, and it is expected that two or three years will elapse before Europe will be in the Argentine market on a quantity basis.

At present the small narrow tread type of European car is not suited for the Argentine market, so far as the country is concerned, but narrow tread cars of this type will cut into the city trade of

American cars. At present the sale of American cars in Argentina might be divided approximately 50 per cent in the cities and 50 per cent in the country.

Fiat is at present erecting a large salesroom and general office building in Buenos Aires to handle the business for that portion of Latin America.

### Exchange Favors Europe

Argentine importers of American cars wish the American manufacturer to appreciate that selling in Argentina when Europe gets into the field will be different than meeting European competition in the U. S. A. The reason is that European and U. S. A. cars enter Argentina after paying a tariff of approximately 37½ per cent, whereas in U. S. A. the European car has to pay a 45 per cent duty and the American car pays none. This gives a 45 per cent advantage for the American car in the U. S. A. as compared with its position in Argentina.

With the present situation of European exchange the European car has a decided advantage as compared with the American car and, unless exchange conditions improve in the next two or three years, Mr. Rochette looks for active competition from Europe. Competition in selling cars in Argentina is increasing each year. Practically every make of American car is now represented and, in addition to the competition among American makes, there will come the added competition of European factories.

The American manufacturer has so far one distinct advantage over the European in that he is better fitted by way of organization and has a better conception of service requirements than the European manufacturer.

The highway situation has not improved in Argentina since the war and road conditions are approximately as they were in 1916. There are two good highways leading from Buenos Aires to the port of La Plata, a distance of approximately 50 miles, but with this exception there are few highways, and it is practically impossible to drive from Buenos Aires to other cities, such as Rosario, Cordoba and Bahia Blanca, as the roads are not good and the heavy Argentine horse vehicles work them into a condition which makes travel impossible except in the best of weather.

### WANT NEW ZEALAND AGENCY

NEW YORK, Feb. 14—The agency for a medium priced car and truck is sought by the Willerton Motor Engineering Co., Wellington, New Zealand. Suitable banking references will be given. Catalogues from all export firms are solicited.

## Buick Additions to Cost \$10,000,000

FLINT, Feb. 16—Expenditure of approximately \$10,000,000, \$7,500,000 of which will be invested in new buildings and equipment at Flint and the balance in the erection of a new assembly plant at St. Louis, is planned by the Buick Motor Car Co. to increase its production schedule to 750 cars daily. The program provides for the erection of nine buildings and large extensions to three other plants.

Completion of the task will see the Flint factory prepared to turn out 550 cars daily; in addition, the plant at St. Louis will be equipped to assemble 200 cars a day; the bodies for these will be built at St. Louis. The new buildings at Flint include a four story transmission plant, enameling building, motor test buildings, central power plant, drop forge shop, heat treating building for motor shop, hardening room for tool plant, extensions to aluminum foundry, addition to garage building, pattern storage, filling station and central oil house.

## Air Tire Truck Trend Seen at Glasgow Show

LONDON, Jan. 30 (*Special correspondence*)—The first post-war show of motor cars and trucks in Scotland was held recently in Glasgow. Practically every make of British car and truck was on exhibition, but no British tractors. Most of the car exhibits had been seen at Olympia, excepting a rather numerous American contingent, mostly of 6 cylinder cars. The only tractor at the show was the Fiat.

The Scottish show gave reason to hope that the need of trucks of 1000 to 2000 lb. net load capacity on air tires is being recognized by a few British makers. British truck makers will not have this field to themselves, however, as the Garford, G. M. C. and other American air tired trucks are already here, and there is prospect of even heavier tare vehicles on air tires being seen here shortly.

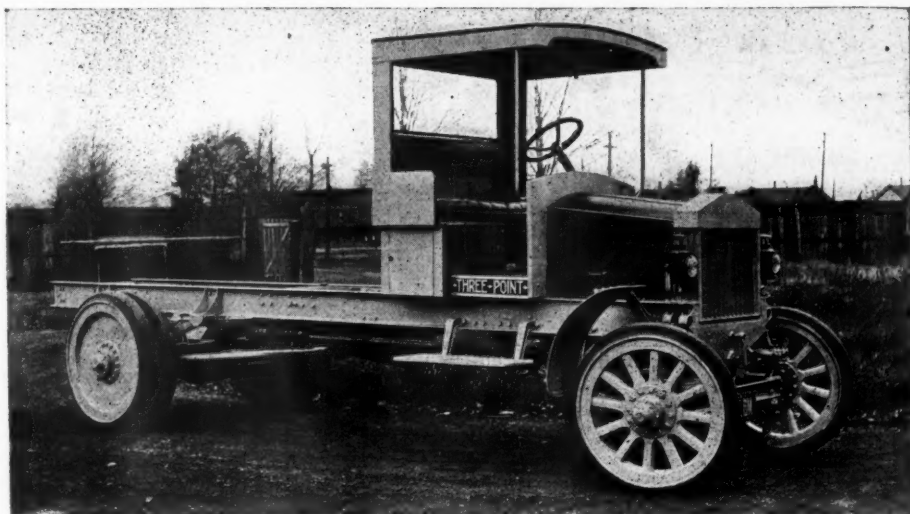
The London General Omnibus Co., through the builders of their chassis—the Associated Equipment Co.—has been testing an air tired chassis of about 7000 lb. gross weight, it is understood, with success. If the air tire be adopted by the company it will probably be after obtaining police sanction to substitute single for double deck buses, following the Paris Omnibus Co.'s model.

ENGLISHMAN.

### KRAUSE GOVERNOR ON SALE

EAU CLAIRE, WIS., Feb. 16—The C-L-S Sales Co. has been organized at Eau Claire, Wis., to take over the exclusive rights for the United States and Canada on the Krause governor for Fordson tractors, which is being manufactured on a large scale by the Kellar Machine Works of Eau Claire. The device is simple and requires but two bolts for attachment. A friction disk on the fan belt regulates the governor. It was designed by Edward Krause here.





### New York Air Brake Company Brings Out Truck

WATERTOWN, N. Y., Feb. 16—A 6-ton truck, to be known as the Three Point truck, will shortly be put in production by the New York Air Brake Co. of this city. In addition to the conventional half elliptic rear springs, the truck has a single transverse cross spring at the front, which carries the frame at its middle on a swivel joint. This construction allows the wheels of the truck to accommodate themselves to uneven road surfaces. The front axle is steadied by radius rods extending from near its ends to a spherical joint at the bottom of the flywheel bell housing. An indirect advantage of the single-point suspension at the forward end is a short turning radius. With a wheelbase of 15 ft., the truck can be turned around in a 50-ft. circle.

To obviate the need of grease cups, the rear end of the rear spring is not shackled to spring brackets, but instead passes through a clip on the frame, which permits of free fore and aft motion. Shock absorbers in the form of four coiled springs are placed adjacent to each of the main rear springs.

The truck is equipped with a Buda 4-cylinder engine rated at 28 hp. The engine is fitted with a governor, which is set to give a speed of 13½ m.p.h. Ignition is by Sims magneto, with fixed timing point. With a full load of 6 tons the gasoline consumption is said to be at the rate of one gal. per 7 to 8 miles. The truck itself has a weight of 8700 lb.

A four-speed gearset is fitted, giving the following ratios on the different speeds: High, 1:1; second intermediate, 1.77:1; first intermediate, 3.53:1; low, 6.25:1; reverse, 8.33:1. Thirty-six by 5 in. Goodrich single solid tires are carried on the front wheels and 40 by 6 in. dual on the rear. Three of the trucks have been finished, and the new machine will be on exhibition at the New York show.

### Lull Carriage Plant Taken Over by Dort

FLINT, Feb. 17—The Dort Motor Car Co. has taken over the plant of the Lull Carriage Co. at Kalamazoo, an investment of about \$500,000. One of the Lull buildings has been turned over and possession of the other will be secured on May 1. The building is to be put in shape with complete equipment of wood working tools and machinery. The other building will be devoted entirely to the assembling, painting and finishing of closed bodies. The Kalamazoo plant will be operated as a complete unit. The wood parts for open bodies will be made here, but the assembly of these will continue at Flint.

### SALES POLICY CHANGED

INDIANAPOLIS, Feb. 13—Sales for the Link-Belt Co. of this city hereafter will be handled direct from Indianapolis instead of from Philadelphia, as has formerly been the custom. Increasing business in this department made the change imperative for reasons of economy and efficiency. Harold S. Pierce, formerly

automobile engineer in charge of chain drive layouts, has been appointed chief engineer of the company, and William H. Bond will act as one of his assistants. Harry Reisser, formerly production manager, has been made sales engineer and will act as direct representative for all automobile customers at the Indianapolis plant.

### Harley-Davidson to Increase Cycle Output

MILWAUKEE, WIS., Feb. 16—The Harley-Davidson Motor Co., Milwaukee, Wis., has decided upon a production for 1920 of 25,500 motorcycles and 13,000 side cars, compared with an output of 22,000 cycles and 16,000 side cars in 1919. To increase the production, a new six-story factory addition of 150,000 sq. ft. is now under construction.

### CUMMINGS LEAVES TIMKEN

CANTON, OHIO, Feb. 13—Arthur Cummings, advertising manager of the Timken Roller Bearing Co., has tendered his resignation. He has not announced any plans for the future.

## Automotive Biggest Twin City Industry

### Output in 1919 Totals \$440,000,- 000—Many New Factories Building

MINNEAPOLIS, Feb. 14—The outlook for automotive distribution for 1920 is good as based on figures for 1919 prepared by the Civic and Commerce Association. Of a total of \$1,059,614,622 manufacturing and wholesale output last year, automobiles, tires and other accessories totaled \$440,000,000, or 41 per cent. This business was divided thus: Motor cars and trucks, \$190,000,000; automotive parts, \$120,000,000; tires, \$75,000,000; tractors, \$55,000,000. The wholesale and jobbing business of the city showed more than 25 per cent increase over 1918. Manufacturing industries have gained \$323,000,000 in five years. At the automotive show, Jan. 31-Feb. 7, a little more than \$2,000,000 products were sold, including airplanes.

Minnesota alone had a total crop value of \$466,391,000 in 1919 and the outlook for 1920 is the best in the last ten years, according to President E. G. Quamme, of the Federal Land Bank.

Construction of buildings for automotive work is already under way. The Schurmeier-Whitney Co., builder of motor truck bodies, is constructing a plant on railroad trackage across a street from the assembling plant of the Ford Motor Co., to cost \$100,000, with capacity for an additional three stories, making six, 46 x 100. Headquarters of the company is 321 East Sixth Street, St. Paul. The company was established in 1852 and made prairie schooners at that time.

The Beeman Tractor Co. has bought six acres of land in Columbia Heights for a plant to make tractor hitches and attachments. The company, 307 Sixth Avenue S., has had its engines made at Port Washington, Wis., but is executing other contracts because of increase in output demand. The American Tractor Co., \$1,500,000 capital, offices at 1616 Pioneer Building, St. Paul, is preparing to distribute the Cata-Gripper truck, manufactured at Eau Claire, Wis., from the Twin Cities. A. A. Robbins is president.

Lindsay Brothers Co., old-established implement house, has taken the Lauson truck territory in the Northwest. C. E. Woodward has been named manager.

### Makers Enlarge Branches

Truck manufacturers are preparing for big business by enlargement of branches and other changes. The Oneida has established St. Paul service and sales at 171 University Avenue, with the St. Paul Oneida Truck Sales Co. The F. W. D. has opened new headquarters in the Dundas Garage, Aberdeen Hotel, St. Paul. The Dundas Motor Co. will distribute these trucks in the Northwest. The Nash Sales Co. has opened Nash service and sales at 1008 Nicollet Avenue, which is an innovation as to this district for truck sales. The Chevrolet has opened its retail sales also.

# Federal Aid Road Work Shows Big Increase in Many States

Government Allows \$46,107,333 on Projects Costing \$95,498,-

140 in First Ten Months of 1919—1927 Projects

Representing 18,596 Miles—Minnesota Leads

WASHINGTON, Feb. 13—Federal-aid allowance to the various states for road construction in September and October amounted to \$24,780,906.43, or about one-fourth of the total amount of Federal-aid money apportioned to the states for the present fiscal year. On Oct. 31, 1919, 1927 projects, representing 18,596.7 miles of highway had been approved and 1065 projects, representing 8407.2 miles awaited approval. The total amount of Federal-aid approved for the first 10 months was \$95,498,140.85, and the agreements executed totaled \$46,107,333.38.

Minnesota led in the number of systems approved, with sixteen; New Hampshire and West Virginia each had fifteen and Nebraska eleven, with Nebraska mileage the greatest, totaling 217.3. Indiana had the second largest mileage, 185.8; Montana had 106.5 and New Mexico, 95.5. The Nebraska roads will be earth, gravel and sand-clay. Indiana roads will be of asphalt, brick or concrete, while Minnesota and West Virginia projects will be chiefly hard surface construction, and the Montana and the New Mexico roads of earth or gravel.

One of the four Indiana projects breaks the record for estimated cost and for Federal-aid allowance. It is for 114.4 miles of road running from Evansville north through Vanderburgh, Warrick, Spencer, Dubois, Orange and Lawrence counties, estimated to cost \$4,223,076, and will be given Federal-aid to the amount of \$2,111,538. Another Indiana project for 56.7 miles in Lake, Porter and Laporte counties of the same construction will cost \$2,292,351, with an allowance of \$1,134,000. This is the third largest project in estimated cost in the records.

## Indiana and Kansas Lead

Kansas follows Indiana in September's record. Her five projects approved have an aggregate cost of \$3,498,754.59 for 87.28 miles of road, and will receive \$1,309,200 Federal-aid. The largest Kansas project is for 44.5 miles of concrete road in Summer county, estimated to cost \$1,622,808, with an allowance of \$667,500. Unlike the Indiana projects, this is all in one county and is to date the largest project on record for a single county. A second Kansas project for 25.07 miles of asphalt, brick or concrete road in Dickinson county will cost \$1,119,648.47, according to the estimate, and will receive Federal-aid to the amount of \$376,050.

Illinois had two new projects and a revised project approved for an aggregate mileage of 50.83, at an estimated

cost \$1,995,711.40 and Federal-aid of \$1,043,090.70. The revised project was for additional mileage of 10.7, at an estimated cost of \$837,001.80 and Federal-aid of \$463,735.90 for a bituminous macadam or concrete road in Kankakee and Iroquois counties. This revision gives this project, Illinois No. 2, a total length of 65.2 miles, an estimated cost of \$1,741,701.80 and an allowance of \$870,850.90, making it the fourth largest project approved in Federal-aid up to Sept. 30, 1919.

Sixteen new and two revised projects in Minnesota, aggregating 161.25 miles in length, are estimated to cost \$1,436,385.64, and will receive an allowance of \$673,997.68. Texas is the fifth state whose projects approvals for the month exceed \$1,000,000. Seven new and one revised project in that state, 87.491 miles long, will cost \$1,126,006.68, and receive Federal-aid amounting to \$422,703.

California will receive \$475,688.95 Federal-aid on four projects estimated to cost \$951,377.90; Maryland, \$456,464 of Federal-aid for five new and one revised project to cost \$948,879.25, and West Virginia \$438,689.10 Federal-aid for fifteen projects estimated to cost \$912,124.90.

## September Leads in Projects

The Bureau of Public Roads considered more Federal-aid projects in September than in any previous month. The record shows 165 projects statements approved, eight revised statements approved and two withdrawals, while ninety-eight project agreements and twenty-three modifications of previous agreements were signed by the Secretary of Agriculture.

October was another big month in the consideration of Federal-aid projects, and the figures for both statements approved and agreements executed made records. Statements approved numbered 185, and there was one revised statement in which the allowance of Federal-aid and the estimated cost of the road was increased. This is the largest number of statements so far approved in a single month. The mileage of the roads involved showed an increase of 232 miles over the large September mileage. There was a decrease, however, from the previous month in the estimated cost of the roads and in the total amount of Federal-aid called for in the approved projects.

In project agreements signed by the Secretary of Agriculture there was a big increase over the September figures, making the October record far ahead of that of any previous month. The

Federal-aid allowance on these agreements was at the rate of \$100,000,000 a year. The Federal-aid allowance in the projects approved during the month was at the rate of \$145,000,000 a year. Of the agreements executed all represented approvals made in previous months.

The figures for October were: project statements approved, 185; revised, 1; withdrawn, three, mileage of projects 1,848,098, estimated cost of roads, \$25,502,372.28; Federal-aid allowed \$12,077,150.19. Project agreements signed, 138; modifications of previous agreements, twenty; mileage, 888,948; estimated cost, \$19,227,497.09; Federal-aid allowed \$8,365,798.92.

In the statements approved the estimated cost of roads in eight states is greater than \$1,000,000, while two States will receive Federal-aid amounting to more than that amount. Several States which have not heretofore taken high rank in the monthly record of approved statements came to the front in October.

## Iowa Banner State

Iowa is the banner State for the month, being first in total mileage involved in the approvals, in the estimated cost of the roads and in the Federal-aid allowed. She was third in the number of projects approved, fourteen. The total mileage of the roads in these fourteen projects is 216.81, no other State's approvals representing as much as 200 miles. The estimated cost of the roads is \$3,978,847.95 and the Federal-aid allowance \$1,951,750.

North Carolina with an estimated cost of \$2,182,381.36, an allowance of \$1,091,190.66 for eighteen roads having a mileage of 135.61, stood next to Iowa in the amount of Federal-aid and the cost of roads, and second in number of projects and fourth in mileage.

Tennessee was third in estimated cost and Federal-aid allowed, the figures being respectively \$1,849,780.39 and \$924,890.17, for six projects having a mileage of 97.69. Georgia had twenty-three statements approved, eight more than North Carolina, the second State in the number of projects. They were for 147.05 miles, next to the largest mileage of the month. The estimated cost of the roads is \$1,779,729.56, the fourth on the list. Michigan, Oregon, Missouri and Texas are other States represented by approved statements aggregating more than \$1,000,000.

In the cost of the roads in the agreements executed Ohio led all the other States, with an estimated cost of \$2,543,483.80, for which there will be a Federal-aid allowance of \$1,119,000. Illinois was second in the estimated cost of her project agreements, \$2,877,565.18, and first in the amount of Federal-aid, \$1,431,900.74. Indiana came third in the cost of the projects and second in Federal-aid allowance, the figures being \$2,294,383.23 and \$1,125,000. Washington and Georgia are other States in which the estimated cost of the roads in the agreements exceeded \$1,000,000.



## Distillate Users Want New Carbureter

LOS ANGELES, Feb. 14—Distribution of distillate on the Pacific Coast has been discontinued by the Standard Oil Co. and thousands of motorists who have been running their cars on this fuel will be forced to use gasoline unless a carbureter is perfected to burn kerosene. Confirmation of the report that the distribution of the fuel was to be discontinued was obtained from the Los Angeles office of the Standard Oil Co.

The reason assigned is that production of crude oil is insufficient to permit of the making of distillate. For many months there has not been enough crude oil taken from the ground to meet the demand and reserve stocks have been called on to help out in the emergency. This reserve is said to be getting dangerously low and therefore it becomes necessary to make the crude produce all the gasoline possible.

Distillate is an early stage in the refinement of gasoline from crude oil and contains many of the qualities of gasoline. With an ever-increasing demand for gasoline and an actual inability to meet it the Standard Oil Company is refining the crude more thoroughly to produce more gasoline. Thousands of motor vehicles on the coast have been operating on distillate.

## Pierce-Arrow Adopts New Testing Method

BUFFALO, Feb. 10—A new method of engine testing, similar to that employed for aircraft engines during the war, has been adopted by the Pierce-Arrow Motor Car Co. After the engine is assembled it is first run-in under electric power to limber up its parts. It is then run under its own power for

a number of hours at different speeds and outputs. Throughout this run the engine is under observation as to internal friction, speed and horsepower developed. Next the engine is disassembled, the parts are inspected and if they are found all right, it is reassembled, or if anything is found not right it is corrected and all necessary adjustments are made.

The final test of the engine takes place in a silent room in which it is coupled to an electric dynamometer. Complete data of the power output, gasoline consumption, internal friction and other factors are recorded, and the tester adjusts ignition, carburetion and valve action.

## Air Service Places Metal Supply on Sale

WASHINGTON, Feb. 14—Quantities of bronze bars, copper sheets, copper tubes, sheet steel, commercial steel bars, including steel bars, aluminum sheets, pig lead, zinc spelter and chrome vanadium steel strips, are offered for sale by the United States Army Air Service. Quantities and complete information can be learned by addressing the Material Disposal and Salvage Division of the office of the Director of Air Service, Washington, D. C., or by addressing any of the district offices of the Air Service, attention Material Disposal and Salvage Division, at Boston, Buffalo, Chicago, New York, Dayton, Detroit and San Francisco. The materials offered for sale are located in the various warehouses about the country.

## GIVES KILN DRYING COURSE

MADISON, WIS., Feb. 12—The University of Wisconsin has announced a new correspondence study course in kiln drying of lumber.

## Reo Company Sued by Kansas City Firm

### Failure to Deliver Cars and Non-Renewal of Contract Basis of \$150,000 Suit

KANSAS CITY, Feb. 13—J. Frank Witwer, president of the Southwest Motor Co., has sued the Reo Motor Car Co. of Lansing for \$150,000. This suit is based on the alleged failure of the Reo company to deliver cars to Witwer, and failure to renew a contract with Witwer, based on promises that it would be renewed, according to the papers recently filed.

Witwer, who for several terms was president of the Kansas City Motor Car Dealers' Association, had been Reo distributor for its southwest for ten years. Witwer claims to have invested several thousand dollars in remodeling a building for his agency, on the assumption that he would continue as the Reo distributor, but the business was taken from him and given to another Kansas City firm.

Papers in the suit were served in Chicago at the Reo dinner to dealers on Jan. 28. Witwer is one of the pioneer dealers of the territory, having started thirteen years ago.

## INDIA TIRE CO. TO EXPAND

AKRON, OHIO, Feb. 14—The new building and improvements to the former building of the India Tire & Rubber Co. have been completed. An increase in the capital stock of the company from \$1,500,000 to \$5,000,000 as ratified by stockholders recently, will be used for caring for business expansions.

## The New Handley-Page Pullman



*This new Handley-Page model has been put into the passenger service from Crickelwood, near London, to Paris. On its first round trip, the air lines maintained an average speed of 120 m.p.h.*



*Showing the salon of the aerial Pullman, giving an idea of the comfort offered passengers*

## Offer 33,000 Francs for Prize Tractors

### Belgian Counsel Announces Conditions of Tests Open to American Makers

NEW YORK, Feb. 14—Further information on the exhibition and demonstration of colonial tractors to be held in Belgium under the auspices of the Belgian Minister of Colonies, have been received by the Belgian consul in this city.

There will be organized a competition of mechanical tractors suitable for soil cultivation, for hauling vehicles on dirt roads and also for operating agricultural machinery by means of belts. The sum of 33,000 francs will be awarded in prizes for the tractors which best satisfy the conditions of the test. This sum will be divided as follows:

1. Tractors operating on palm oil or any other vegetable oil produced in the Congo—first prize, 15,000 francs; second prize, 10,000 francs.

2. Tractors operating on heavy petroleum oil—first prize, 5000 francs; second prize, 2000 francs.

Tractors of both Belgian and foreign manufacture will be admitted to the contest. No entrance fee will be charged. The tractors must arrive before March 15, 1920, at the Agricultural Department of the Ministry of Colonies, 7, Rue Theresienne, Brussels, and must be accompanied by a set of specifications in conformity with the blank which will be sent upon request. At a speed of 3 km.p.h. (1½ m.p.h.) the tractors must be capable of a minimum draw bar pull of 1000 kg. (2200 lb.) and they must be fitted with a reverse gear.

The tractors will be submitted for 6 to 10 days to plowing tests, to traction tests on dirt and sand roads and to belt power tests. The consumption of fuel, water and lubricant will be determined by the jury.

The personnel, the fuel and the lubricant necessary for all of the trials required by the jury will be furnished by the contestants at their expense. The jury, however, may demand the use of palm oil of normal composition for certain trials, in which case this fuel will be furnished free to the contestants. The jury also may impose the use as fuel, in the case of the heavy petroleum engines, of a petroleum residue which it will furnish free to the contestants.

The road traction trials may be extended over daily routes up to 40 km. (25 miles). It may be prohibited to dismount the engines for cleaning during the entire time of the contest, the jury reserving the right to have this cleaning effected at the end of the contest with the object of determining the interior condition of the engines.

Awards will be made in accordance with the following system of points:

Adaptability of the tractor to work in Africa .....	20 points
Absence of stops due to smudging or other causes..	30 points

Solidity of construction, facility of maintenance, of adjustment and handling.....	20 points
Consumption by weight of fuel per ton moved (total load) ..	20 points
Starting .....	10 points

100 points

Any request for supplementary tests must be accompanied by a deposit of 100 francs. The jury reserves the right to grant or refuse this test. The jury determines all the details of the trials and its decisions are without appeal.

### Alpine Tour Arranged to Test Car Stamina

PARIS, Feb. 1 (*Special Correspondence*)—There will be held in France an important Alpine touring competition for automobiles during the month of August of the present year. While no account will be taken of speed, this competition will be one of the most difficult ever held in Europe. The basis of the event will be regularity, and penalization will be incurred for stops of any kind whatever, even including fouled spark plugs. The event, which will probably last a couple of weeks, will comprise all the highest passes in the Alps, including the Galibier and the Lautaret, where the road passes at a height of nearly 9,000 ft., as well as the highest passes in the Pyrenees.

These Alpine trials will be open to all classes of cars, and by reason of the system of awards it will not be necessary to have a big powerful machine in order to win the first place.

The event has met with considerable interest among French, Italian and English manufacturers, who recognize that this is a test which will prove something. American cars doubtless will be entered by dealers in France.

### Schurmeier-Whitney Buys New Plant Site

MINNEAPOLIS, Feb. 14—Building in the automotive line is beginning with renewed vigor. One of the last bits of construction information has been announced by the Schurmeier-Whitney Co., which has obtained a site across the street from the big Ford Motor company plant on which it is building an enormous plant for the manufacture of truck bodies. The building will be 100 x 141, four stories with foundation for four more stories, to cost \$100,000. The company has made wagons since 1852.

### AERIAL PHOTOGRAPHY

NEW YORK, Jan. 12—The Curtiss Aeroplane & Motor Corp., Garden City, has established a department of aerial photography, under the management of Capt. J. A. Morrell, formerly of the Royal Air Force.

### France at Work on War-torn Highways

PARIS, Feb. 1 (*Special Correspondence*)—A big effort is being made to repair the French roads which were damaged by direct warfare, and to put into condition those which have suffered by reason of neglect. In the war zone 30,000 miles of road called for complete rebuilding. Of these 7,500 miles have now been repaired.

For this work the road department of the French Government employed 3,000 men, including both civilians and soldiers. They laid down 80,000 cubic meters of stone carried in 4000 trains and made use of 300 steam or gasoline road rollers.

During the war every bridge or viaduct in the zone of operations having 50 yards span was either destroyed or damaged. Of these 3,137 have to be rebuilt. In some cases these bridges were rebuilt as the army advanced, but when the armistice came there remained 1,414 to reconstruct. This work was most urgent, and in order to gain time various kinds of constructions were adopted. Within one year 873 bridges have been rebuilt, the total length of these being 10 miles. There have also been built 1,120 bridges or viaducts having a length of less than 50 yards.

### Tractor Difficulties in Far East Reported

WASHINGTON, Feb. 14—Among the factors that enter into the question of the market possibilities for tractors in all Far Eastern countries are the comparatively small areas of the individual farms, the limited possible purchasing power of the individual farmers, the high cost of gasoline and other fuels, the nature of the soil to which machinery must frequently be adapted by modification, and, in some countries ignorance of those who would have to operate the machines, according to a report received by the Bureau of Foreign and Domestic Commerce. However, the shortage of food and the scarcity and high cost of labor have induced many of the Government officials and large estate owners to attempt to solve these problems by the introduction of modern methods and implements.

### HERCULES ADDS TO STOCK

CANTON, O., Feb. 14—Papers have been filed with the secretary of state increasing the authorized capital of the Hercules Motor Manufacturing Co. of Canton from \$1,000,000 to \$1,500,000. This is done to provide for betterments and extensions to plant.

### TIRE CO. TRIPLES STOCK

DAYTON, O., Feb. 14—The Master Tire & Rubber Co. has increased its authorized capital from \$300,000 to \$1,000,000 to permit of building a large addition to the plant. The concern manufactures tires and tubes.



## Questionnaire Shows Shortage of Mechanics

CLEVELAND, Feb. 12—That there is a definite shortage of automobile mechanics in the country was indicated as the result of the questionnaire sent to 100 service managers throughout the United States by the Automotive Association of the Cleveland Chamber of Commerce recently.

An interesting situation arose when the answers to the question: "Have you ever employed automobile school graduates," were surveyed. Ninety per cent answered yes, but 56 per cent, in criticizing the automobile school graduates said, "Too much theory"; thirty-three per cent of those answering said "The automobile school graduate was not willing to start at the bottom."

Concerning the charge that automobile school graduates have "too much theory," a note is attached calling attention to the fact that it probably would be nearer the meaning of the 56 per cent if they had answered: "Not enough practice," instead of "too much theory," and the suggestion is made that the school should always teach their men that, in spite of their training, they should be willing to start at the bottom.

To the question, "How much practical experience do you require of the man you wish to hire?" the answer averaged two and a-half years. Seventy per cent required references, and the same number looked up these references. Twenty-two per cent of these service managers considered an automobile school diploma a good reference, 78 per cent answered "No." Most of the managers ignored the diploma entirely.

In every instance, the service manager answered that the apprentice system turns out the better mechanic, as compared with the automobile school. In giving reason for this, 30 per cent said "More practical experience," and 20 per cent answered that they wish to develop their own men.

## Duesenberg Postpones Florida Speed Trials

ELIZABETH, N. J., Feb. 14—Temporary abandonment of the Duesenberg attempt to lower world's speed records at Daytona Beach was forced because of bad weather conditions in Florida. A Duesenberg Special, to be driven by Tommy Milton, was scheduled to go after the records now held by De Palma and the car was shipped as far as Jacksonville. Bad weather, however, precluded trials at present and the car was diverted to California, where it will be used in the races on the new Beverly Hills track.

## Lapeer Trailer Co. Changes Ownership

DETROIT, Feb. 10—The Lapeer Semi-Trailer Co., at Lapeer, Mich., has been sold through the Walter S. Darden Co., Detroit real estate brokers, at about

par, for the \$100,000 of capital stock of the company. Darden declined to say for whom he was acting in the deal, and neither would he affirm nor deny that it was General Motors.

As soon as the inventory is completed, Darden said, the new owners would put \$200,000 into the company immediately, for the purpose of expansion, to care for the business in hand. Eventually, he said, another \$200,000 would be invested in additional buildings and plant equipment, to care for the prospective increase.

## Start Construction of Rauch & Lang Plant

HOLYOKE, MASS., Feb. 14—Production of the new Rauch & Lang passenger electric cars will be started early in the spring in the new factories now under construction at Chicopee Falls. Later details of the company formed by Ray S. Doering, president of Stevens-Duryea, show that it is capitalized at \$5,000,000 in preferred stock and 100,000 shares of no par value common.

The first \$100,000 of the capital stock has been paid into the Holyoke National Bank. General organization of the new company has been in the hands of Frank J. O'Neil, a director.

Building material and equipment for the first unit of the factory, which is to be 320 x 300 ft. has arrived. In all the company has a five-acre tract on which to develop its plant, all of it having excellent railroad frontage. The site was under consideration by the Rolls-Royce interests for a time.

## Steel to Be Topic of Indiana Meeting

NEW YORK, Feb. 11—W. R. Shimer, of the Bethlehem Steel Corp., will be the speaker at the Indiana Section meeting of the Society of Automotive Engineers at the Hotel Claypole, Indianapolis, Feb. 20.

In his paper, entitled, "Steel in the Automotive Industry," Shimer will discuss the essentials of high grade steel manufacture, the application of different types, the principles governing the choice of steels and the factors to be considered in selecting sources of supply. Stereopticon and motion picture views will accompany the reading of the paper.

## DEVISE OIL TREATMENT

WASHINGTON, Feb. 14—The Army Air Service has devised a method for treating airplane engines for long time storage which is expected to keep them in excellent condition. Work is being done at the Aviation General Supply Depot, Little Rock, Ark., where 7300 engines have been treated, of which 5587 were Liberties. The engines are treated with oil and the 7300 have required 250,000 gal. Machinery has been installed so that it takes but six minutes to complete treatment for each engine.

## Paragon Motor Co. Begins Construction

Connellsville, Pa., Selected as  
Home of New Light 4—  
Production in Summer

CONNELLSVILLE, Pa., Feb. 14—Erection of the plant of the Paragon Motor Car Co. is to be started at once on a 20-acre site in this city. Under present building plan five acres of floor space will be employed for the manufacture of the Paragon car, quantity production of which is expected by early summer.

The Paragon is to be made in three models—5-passenger touring 4-passenger sport-car, and 2-passenger roadster, mounted on a standard chassis with a wheelbase of 122 inches, and carrying 32 x 4½ cord tires. The weight will be under 3,000 lbs., and the list price will be about \$3,000. A series of experimental cars are now being built in Cleveland.

Paul F. Hackenthal, vice-president and chief engineer of the company, is the designer of the new car and engine. He was formerly assistant chief engineer at the Mercer and Templar plants.

The car is designed along low hung lines, and is to be powered by a 3¼ bore by 5½ stroke overhead, valve, high-speed, high-compression four-cylinder engine developing over 50 hp. Both engines and cars are to be built throughout at the Connellsville plant. The engine is said to have a unique method of carburetion, careful balancing to minimize vibration and a highly perfected overhead valve action, provided with positive lubrication.

In selecting Connellsville as the manufacturing site the company was influenced by its position, sixty miles from Pittsburgh, on the connecting pike between the Lincoln and National highways, which affords excellent facilities for driveways to all distributing points. It will be served by four railroads, inexpensive power and easy access to sources of supply. It is also near the famous Uniontown test-hill and speedway.

Officers of the company are J. Fred Kurtz, president; C. H. Landsittel, formerly director of purchasing at Haynes and Templar, general manager; Charles E. Bailey, formerly assistant sales and advertising manager of Templar and Hal, director of sales and advertising; R. Karasinski, formerly designer of Premier and Cleveland, assistant chief engineer.

## NOT A SEDAN

In our issue of Jan. 22 we referred to an illustration of the Briscoe coupé as a sedan. Although we stated that a coupé is virtually a miniature sedan, we did not intentionally convey a wrong impression of the particular make in question and take the present opportunity of correcting the mistake.

## Exchange Rates Hit Canadian Imports

### Distributors and Factories Seeking Plan for Establishment of Selling Basis

TORONTO, Feb. 13—The present exchange rates between the United States and the Dominion is hitting many Canadian industries badly and especially those which buy the bulk of their goods in America. Owing to the fact that the majority of the motor car and truck distributors are either agents or dealers for United States motor manufacturers, there is a general opinion abroad that they will all be badly hit by the existing rate of exchange.

From inquiries made yesterday the importing distributors and dealers are not losing much sleep over the matter, as they contemplate that before the real busy season commences the exchange situation will have returned to nearly normal.

Some agents will, however, be compelled to suffer loss when cars ordered at a stated price before the exchange took an attack of fever are ready for delivery. The agent in such transactions will have to bear the loss caused by the present low price of the Canadian dollar. Most United States manufacturers insist on payments at the rate of exchange existent on the day of the delivery of the car.

Here is a case in point. A Toronto agent is expecting delivery next week of five expensive motor trucks ordered at a stated price some months ago, and his clients will not be expected to pay any additional sum above the contracted rate. The agent in such a case must, however, pay to his United States manufacturer the wholesale price plus the exchange rate of the day of delivery. On five trucks this would mean a large sum of money, so the agent is asking the manufacturer to allow him to pay into a Canadian bank the amount of his bill, such money to remain to the credit of the manufacturer until such time as the exchange is near to par. This solution of a difficult position is one that is likely to be followed in the majority of like cases.

Some firms are quoting the price of a car ordered to-day plus the rate of exchange existing on the day the order is placed and taking a chance whether it goes up or down. But the motor car dealers do not think this state of affairs can last very long. On the other hand, they are not inclined to believe that the circumstance of the exchange rate will drive purchasers to the ranks of the cheap cars. As one dealer clearly put it, "if a man has made up his mind to have a car he will get it." However, there have been many cancellations and some distributors of the United States cars have suspended orders and others have returned shipments of cars and trucks.

Much regret is expressed over the apparent failure of the N. A. C. C. to

arrange long term credits. Some United States manufacturers of automotive equipment are said to have advised the trade here that Canadian exchange will be accepted at par while others offer to split the exchange.

Most sales for future delivery are made with a saving clause "plus exchange," while others quote a sliding scale of prices according to the exchange rate obtaining. The big jobbing equipment houses are buying everything possible from Canadian manufacturers.

## Organize \$3,000,000 Steel Firm in Milwaukee

MILWAUKEE, Feb. 16—The Milwaukee Rolling Mill Co. has been incorporated with a capital stock equivalent to \$3,000,000 to build a new sheet mill in Milwaukee which will have a capacity of 45,000 to 60,000 tons annually and serve several of the largest local industries, including the A. O. Smith Corp., the Milwaukee Corrugating Co., and builders of motor car bodies, fenders, etc.

The incorporators are Fred Vogel, Jr., Walter Kasten and Robert W. Baird, officers of the First Wisconsin National Bank and First Wisconsin Trust Co., the largest financial institution in Wisconsin. W. W. Irwin, until recently president of the Canton Sheet Steel Co., Canton, O., will, it is stated, be president and general manager of the new Milwaukee concern.

Contracts have been awarded for a main mill building, 425 x 386 ft., providing room for sixteen lines, with an initial installation of an eight-mill plant made by the Mesta Machine Co., Pittsburgh. Six large cranes will be furnished by the Milwaukee Electric Crane & Mfg. Co. The Northwestern Bridge & Iron Co. of Milwaukee is engineer and contractor.

## Fisher Company to Build \$500,000 Body Plant

CLEVELAND, O., Feb. 14—Fisher Body Ohio Co. has purchased a 40-acre site here at a cost of \$500,000, on which to begin the erection of a plant to contain 1,500,000 sq. ft. of floor space. The new building will rank as one of the world's largest automobile body plant units.

### TO MAKE MILLING MACHINE

TOLEDO, OHIO, Feb. 14—The Toledo Milling Machine Co. has been formed by a number of local manufacturers to place on the market a milling machine which, it is claimed, will prove a remarkable time and labor saver. The company will have a capital of 500,000 shares of preferred and 500,000 of no par common. A building, 100 x 400 ft., will be erected. Herman Saxon will be general manager. John Geismar, of the National Supply Co., is president, L. J. Hinde, of the Toledo Machine & Tool Co., vice-president, and Paul Bateman, secretary-treasurer.

## Await Developments in Wheel Merger

### Representatives of Hayes, Imperial and Pioneer Suspend Negotiations for a Time

DETROIT, Feb. 14—Merger of the Hayes Wheel Co., at Jackson, Mich., the Imperial Wheel Co., of Flint, Mich., and the Pioneer Pole & Shaft Co., at Piqua, Ohio, is at a standstill, if not actually off. The merger was being promoted by C. B. Hayes, president of the Hayes Wheel Co., who it was reported was acting for General Motors Corp.

Hayes was in New York, where it was said he is endeavoring to promote a similar merger, with the Imperial Wheel Co. eliminated. Which other companies, in addition to the Pioneer Pole will be included, could not be learned at Jackson.

President Bonbright, of the Imperial Wheel Co., said recently, his company was not actually out of consideration, but, as he expressed it, "they had their ears open."

"All we want," said Mr. Bonbright, "is a fair deal. We have as good a line of customers as any company in the industry, and we do not propose that our company shall simply get out of existence. It would be more proper to say that the deal is at a standstill, rather than to say it is off completely. I did not know Mr. Hayes was in New York, nor had I heard that he was endeavoring to promote another merger, leaving the Imperial out of consideration."

Salmon & Co., New York bankers, who were to finance the merger, conducted the negotiations, looking to the acquiring of the Imperial Wheel and the Pioneer.

### SPICER TO RECAPITALIZE

DETROIT, Feb. 14—Spicer Mfg. Co. has called a meeting of the stockholders for March 1, to act on a proposal to make the authorized capital 100,000 shares of 8 per cent preferred and 600,000 shares of no par common. Present authorized capital is \$1,500,000 8 per cent preferred and 7,000,000 common of \$100 par value and 500,000 second preferred. The present outstanding common would be exchanged at the rate of four shares for one.

### TO ENLARGE RACINE PLANT

RACINE, WIS., Feb. 16—The McCord Mfg. Co., which recently acquired the plant and business of the Racine Mfg. Co., Racine, Wis., manufacturers of fine motor car bodies, at a price said to be in excess of \$1,200,000, has announced plans for material enlargement of the works. The first addition will be a battery of new dry kilns, 100 x 150 ft. C. F. Brand is general manager at Racine.

### WOULD REPRESENT MAKERS

NEW YORK, Feb. 14—The Eastern Electric & Trading Co., electrical engineers and traders, of Bombay, India, is seeking appointment as representatives of American manufacturers.



## French Car Makers Short on Leather

Bureau of Foreign and Domestic  
Commerce Reports Field  
for Tanners

WASHINGTON, Feb. 11—A shortage of automobile leather is reported from France to the Bureau of Foreign and Domestic Commerce, and American tanners, it is stated, will find an excellent market among French manufacturers. There are fifty-six automobile manufacturers in France, eight of whom manufacture their own bodies, the other forty-eight letting this work out on contract. Paris and Lyons are the two big centers of the body-builders.

The firm of Quantin and Billeter, one of the six most important "carrossiers" of Lyons, claims that it uses between 1200 and 1500 hides annually. This represents the average consumption of the larger concerns. It will be found that there are a great many firms of medium size with no very large ones dominating the field.

Lists of the most important body-builders in Paris and Lyons, of the automobile manufacturers who are in the market for leather, and manufacturers and dealers of automobile leather, can be obtained from the Bureau of Foreign and Domestic Commerce or its district or co-operative offices by referring to file No. 41406.

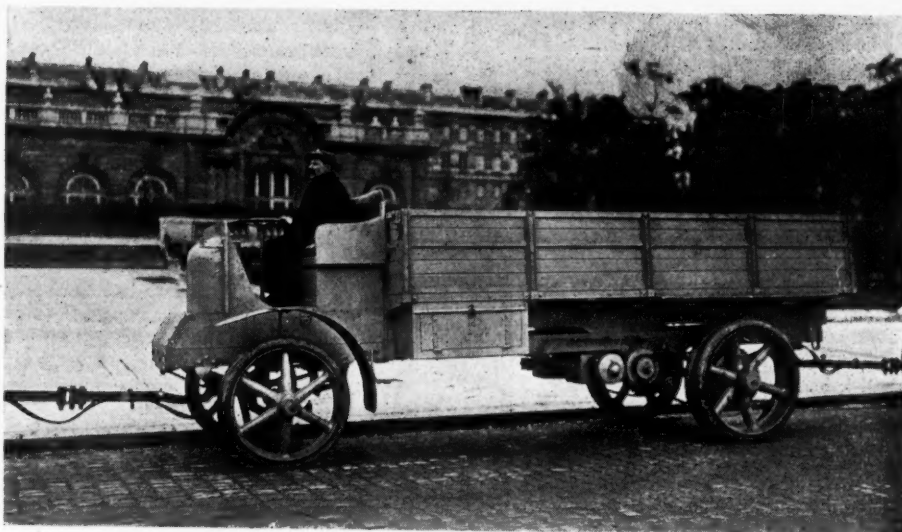
Both the automobile manufacturers and body-builders largely use grains. Among the automobile manufacturers the favorite finish is a black pebble grain, semi-bright finish. This grain is used in preference to a straight or long grain, because the manufacturers claim that they can turn the pattern in any direction and thereby get greater cutting value out of the hide.

Body-builders, on the other hand, can use a greater variety of finishes such as straight grain and Spanish leathers in various colors because they are seeking individuality. They are not, however, fully acquainted with the large variety of American finishes because before the war most of the leather was furnished by the British and Germans. The French tanners probably furnished less than half of the total consumption.

It must be remembered that large hides are wanted; those which measure at least four square meters are preferred, but under present conditions French consumers can probably be induced to take smaller hides.

### GOODYEAR PLANS BUS LINE

AKRON, OHIO, Feb. 14—Definite announcement that a bus line would, in a measure, supplant street cars was made by officials of the Goodyear Tire & Rubber Co. The company plans primarily to establish the line for the benefit of its employees, and it will be routed so as to furnish opportunity for transportation to the best advantage of the company's 30,000 employees.



### New French Gasoline-Electric Road Train

Upper—One of the motor trucks in the train

Lower—The Crochat generating truck

PARIS, Feb. 9.—The latest road train idea in France is the Crochat gasoline-electric road train. This is composed of a gasoline-electric truck with a 50-hp. engine, a generator, and drive to the road wheels by means of two independent electric motors with side chains; also a number of four-wheel motor cars, each with the same rear end as the generating truck, but without a gasoline engine. The leading truck drives itself and also generates the current for the rest of the train. There is one man on each of the trucks whose duties are confined to steering. Generally four to five trucks besides the generator truck are employed.

The Crochat company responsible for this road train built workshop trucks and field illuminating trucks for the Allied armies during the war. All these vehicles had electric transmission. The idea in developing this road train is to get economical operation. It is claimed that this is the most economical method of transmitting power to a train. It cuts out dead mileage, for the trucks can be dropped off at required points and picked up later after they have been loaded or unloaded. Each truck carries a 3-ton load.

In view of the importance of the road train situation, it is the intention of the Technical Committee of the Automobile Club of France to hold a trailer competition next year. There was much trailer development in the army during the period of the war, but the fringe of the market has only been touched commercially.

Crochat trains have already been put to successful commercial use in the southern parts of France and will come into use generally with the reconstruction of roads and bridges in the devastated areas. Aside from the economy in fuel and the increase in cargo space available, the truck and trailer train has been proven of less destructiveness to roads and bridges.

## Milwaukee to Build Belt-Line Railroad

### Plans to Relieve Shipping Congestion and Attract New Manufacturers

MILWAUKEE, WIS., Feb. 16—In recognition of the acknowledged fact that Milwaukee is becoming a great producing center of automotive parts, a strong movement has been put under way to provide this market with adequate receiving and shipping facilities by rail and the improvement of lake transportation facilities in a very broad manner.

A fight of years' standing to better railroad facilities has culminated in the pronouncement by a new administration which has just been elected by the Milwaukee Association of Commerce that work must commence immediately on projects that will relieve Milwaukee from its position as a two-railroad city in order that the growth of the past six months may not be choked aborning. A joint committee on traffic, representing every line of industry, met under auspices of the association this afternoon, to take the first constructive and tangible step in the direction of financing and building a municipal terminal railway or outer belt line.

It is planned to interest local capital in a plan to construct switching and side-track facilities independent of those now owned and controlled by the Chicago, Milwaukee & St. Paul and the Chicago & Northwestern roads, the only two railway systems which enter Milwaukee over their own tracks and right-of-way. The situation is such that it is virtually impossible for other railroad systems to build directly into the Milwaukee terminal. Thus a belt line is proposed as the most feasible means of providing points of contact for connections with other systems, as well as the Chicago outer belt line.

It also would enable the Milwaukee and the Northwestern roads to route their west and northwest bound freight around instead of through the congested Milwaukee terminal. Another big consideration is the fact that the proposed belt line would provide hundreds of advantageous sites for new industries to relieve the present overcrowded condition within the city and suburbs, which will enable existing industries to move for growth and bring many new enterprises to the market.

### Paige Report Shows Plan to Make Parts

DETROIT, Feb. 14—Paige-Detroit Motor Car Co., in a report submitted to stockholders lists earnings before taxes in 1919, of \$2,200,000. Dividends paid on common stock amounted to \$430,000 and on preferred \$72,000. Reservations set aside for taxes totaled \$696,000 and surplus was \$1,300,000. Surplus June 1, 1919, was \$1,854,494.51. It was explained there was taken out of the sur-

plus \$413,000 for 1918 taxes. President Jewett also said considerable had been struck off for depreciation.

Current assets were \$6,721,226.36, and current and accrued liabilities \$1,142,018.83. Total fixed assets were \$1,142,018.83.

The cost of the company's new building was given as \$600,000 and the equipment \$250,000.

The report revealed the intention of the company to manufacture its own parts, and President Jewett said steps looking to that end had been taken.

### Rolls-Royce Hastens Equipment of Plant

SPRINGFIELD, MASS., Feb. 14—Work is being rushed by officials of the Rolls-Royce Co. of America, Inc., in getting the former plant of the Wire Wheel Corp. of America in readiness for operation and present indications are that this will be accomplished within the next two months. There has been delay occasioned by time required by the Government in removing goods stored there.

Plans for the layout of offices and other details of the plant have been adopted. Much of the machinery to be used at the plant has arrived and is being set up as rapidly as the Government goods are removed. Many applications have been received, the officers report, for employment.

### Chandler Profits in 1919 Total \$5,652,255

NEW YORK, Feb. 13—Net profits of \$5,652,255 are shown in the Chandler Motor Car company's annual statement issued yesterday. The aggregate income was \$6,853,139, an increase of \$3,800,370 over 1918. The profits for 1918 were \$2,194,618. In terms of stock the profit was equal to \$31.35 a share on the 70,000 shares of stock. In his annual report to stockholders F. C. Chandler, president, said that production early in 1919 was conservative owing to uncertain conditions following the war, but as conditions improved the company was able to increase the original schedule considerably.

### ONEIDA TRUCK TO BUILD

GREEN BAY, WIS., Feb. 16—The Oneida Motor Truck Co., Green Bay, Wis., has let contracts for a brick and steel factory addition, 60 x 260 ft., to be used as an assembling floor and provide much-needed capacity. This will release large space in the present factory for machine shop and other manufacturing processes. Lafayette Markle is president and general manager.

### EXTEND DEPOSIT TIME

NEW YORK, Feb. 15—Time for depositing stock of the Maxwell Motor Co. and the Chalmers Motor Corp., under the plan and agreement of readjustment, has been extended to and including April 30.

## Canadian Industry Re-elects Officers

### Effect of Coal and Steel Shortage Discussed at Annual Meeting

TORONTO, Feb. 13—Before the annual meeting of the Automotive Industries of Canada in Toronto, President Gordon McGregor of the Industries and vice-president of the Ford Motor Co. of Canada, Ltd., said the coal and steel shortage, due to the strikes, coupled with the demoralized condition of the United States railroads, would so curtail production of cars and trucks that a shortage more acute than that of last year is now inevitable.

Most of the discussion of the annual meeting had to do with the steel and coal shortage. A resolution was passed to memorialize the Dominion Government with a view to establishing preferential trade conditions with the other nations in the British Empire as with Great Britain and especially with Australia.

The election of officers for the current year resulted in the return of the 1919 officers and directorate as follows: President, Gordon M. McGregor; vice-president, R. S. McLaughlin, president General Motors of Canada, Ltd.; directors, C. H. Carlisle, vice-president Goodyear Tire & Rubber Co., Ltd.; Robert Gray, president Gray-Dort Motors, Ltd.; W. T. Sampson, president Ganoque Spring & Axle Co., Ltd.; J. M. Taylor, president Taylor-Forbes, Ltd.; J. C. Perrin, assistant general manager Willys-Overland, Ltd., and W. A. Rowland of the Steel Co. of Canada, Ltd., Perrin and Rowland being the only new men on the board.

### ORGANIZE NEW TOOL FIRM

MILWAUKEE, Feb. 16—The Meigs-Powell Co. of Milwaukee has just been organized to engage in the manufacture of fine mechanical tools, calipers, etc., with headquarters in the Montgomery Building. The principal owners are Arthur E. Meigs and John D. Powell. Mr. Meigs resigned recently as manager of the New York branch of the L. S. Starrett Co., Athol, Mass., and Mr. Powell as manager of the Chicago branch of the same company, after a service of 20 years or more. Production of the Meigs-Powell line is now under way.

### BRITISH COMPANIES JOIN

LONDON, Jan. 30 (*Special correspondence*)—The Birmingham Small Arms Co. (the B. S. A. as it is styled for short) has another amalgamation before its stockholders. The interests concerned are the Aircraft Mfg. Co., of which the aircraft expert, G. Holt-Thomas, is the founder and main owner, as well as of the subsidiary company of Peter Hooker, Ltd., whose ordinary business is concerned with fine limit gage making, and during the war was extended to making the Gnome and Le Rhone aircraft engines.



## Trailers Popular in United Kingdom

### Good Market for American Makes Seen in Development of Motor Routes

WASHINGTON, Feb. 14—Trailers are in extensive use for commercial purposes in the United Kingdom, according to a report from Consul H. C. Claiborne to the Bureau of Foreign and Domestic Commerce. Good roads and the density of the population are the causes, as well as the utilization of the highways for war service and other dislocation during the recent strike.

The carriage of freight by commercial automobiles has already reached large proportions. Routes have been established over distances up to 100 miles, with schedules of rates closely approximating the railways on short hauls and with deliveries from door to door of warehouse or factory.

There is no duty or restriction upon the importation of trailers at the present time, nor any obstacle beyond those of quality, price, delivery and the natural preference for British products, other things being equal. Trailers for the British market should in general have pneumatic or solid rubber tires, as vehicles with metal tires or rims are limited to a speed of five miles an hour against 12 miles an hour for rubber-tired commercial vehicles. There are, of course, a certain number of iron-rimmed wheels used with trailers for very heavy haulage. Trailers are frequently made with solid wheels and both covered and uncovered bodies are used. A set of illustrations of trailers of British manufacture may be examined at the district offices of the Bureau of Foreign and Domestic Commerce upon referring to file No. 2491.

There is a good market for trailers here and the recently announced increase in railway freights should give a great stimulus to motor traction. A list of London dealers in commercial automobiles may be obtained from the Bureau of Foreign and Domestic Commerce, or its district and co-operative offices, upon referring to file No. 2491.

Trailers are of recent adoption in the United Kingdom and are rarely used for passenger service. Practically the entire supply is of British manufacture and is characterized by strength and durability of construction. Cost of manufacture is said to be in excess of that in the United States by at least 15 per cent, owing to the lack of standardization and mass production.

### MANCHURIA MARKET POOR

WASHINGTON, Feb. 14—With 104 passenger cars and fourteen motor trucks in Manchuria and the continued construction of good roads within the city of Dairen, it is thought that there will be additional sales in that market by Consul A. A. Williamson, in his report to the Bureau of Foreign and Domestic Commerce. Within a year it

is expected that a good road to Port Arthur will be opened and this 33 mile stretch will increase the sales possibilities. However, a large business can not be expected inasmuch as the country roads are inferior and the general population is not enthusiastic about automobiles. One firm has had to adopt the club raffle scheme to dispose of its cars. There are a number of taxicabs in Dairen and several tire shops which are importing tires chiefly from Japan.

The motorcycle seems to have a far better future in Manchuria than the automobile, because of the price and the condition of the roads.

## Nash Acquires Half Share in Seaman Company

MILWAUKEE, Feb. 16—The Nash Motors Co., which expects soon to commence quantity production of the new Nash four-cylinder passenger car in its new Milwaukee plant, has acquired a half interest in the Seaman Body Corp. of Milwaukee to insure a constant supply of open and closed bodies for the local plant as well as the six-cylinder plant at Kenosha, Wis.

In addition, the Nash company is engaging in a large body works extension scheme at Kenosha which contemplates the immediate erection of a three or four-story brick and steel body shop, about 50 ft. wide and from 1150 to 1200 ft. long. The Seaman company operates four large factories in Milwaukee and recently started work on a mammoth plant at the northern city limits which will represent an investment of from \$2,000,000 to \$2,500,000.

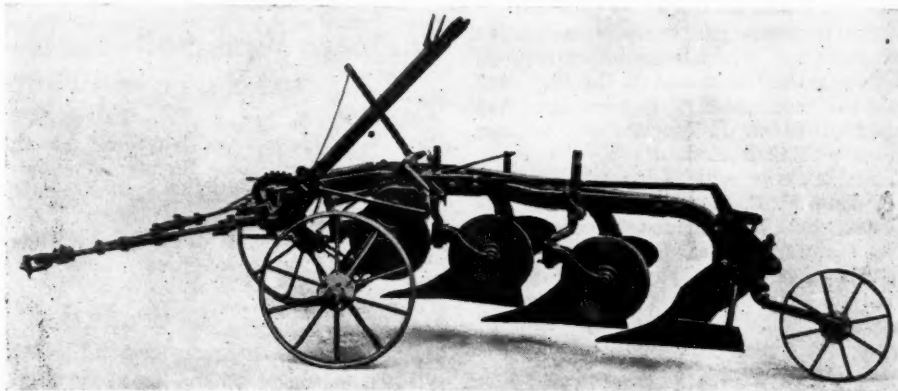
## Tire Makers Take Minneapolis Units

### New Terminal Site Planned as Center of Western Distribution

MINNEAPOLIS, Feb. 14—Completion of a freight warehouse and terminal project will make Minneapolis the second tire distributing city of the country. A \$20,000,000 stock will be carried. Eight big manufacturing companies have leased two of seven terminal buildings. Each is 100 x 600, three stories and basement. These companies are the Goodrich, Goodyear, Federal, Pennsylvania, Canton-Blackstone, Firestone, Oldfield, and Republic. The terminal buildings are connected by short tunnel with the joint freight depot of the city, and through a union terminal railway with the Great Northern, Northern Pacific, Rock Island, Burlington, Great Western, Soo, C., St. P., M. & O. (North Western system), C. M. & St. Paul, and Minneapolis & St. Louis roads.

Several years were taken to plan and lay out the freight tracks to make a minimum expense and loss of time in loading and unloading cars and trucks by the Northwestern Terminal company. These plans are completed, the ground has been leveled, part of the buildings have been erected and the remainder are under way. The plant is in the nature of a Bush terminal as there will be five units for parceling out among other automotive and equipment lines, or other forms of business. The new units will cost \$3,000,000.

## Fiat First European Maker to Build Plow



Fiat has put on the market a plow which, while capable of being used for all purposes, is specially designed for service behind the Fiat agricultural tractor. It is a 3-blade self-lift plow, built entirely of steel forgings and castings, and capable of being converted to 2-blades. The plow is carried on three wheels, two being at the front, with a diameter of 26 inches, and the rear one being a spring-mounted castor type of 17½ inches diameter. The castor wheel keeps the plow in a straight line when plowing, and also enables turns to be made with ease. The two front wheels are spring mounted, this elasticity being advantageous for the general life of the machine and at the same time enabling the plow to ride over obstructions on the ground. All the weight is on the front wheels when the plow is at work. There are three controls: one lever, which is operated by means of a cord from the driver's seat, raises or lowers the entire plow, and two others regulate the position of the front wheels in order to determine the depth of plowing and evenness of the furrow. Total weight of the plow, with drawbar, 1,120 pounds. Its wheelbase is 80 inches, and total length, without drawbar, is 115 inches. This is the first plow to be built in a European automobile factory.

## S.A.E. Plans Airplane and Motor Boat Talks

Interesting Problems to Be Discussed During Shows in New York

NEW YORK, Feb. 19—Motor boat problems will be considered at a meeting of the Society of Automotive Engineers on Wednesday evening, Feb. 25, during the New York Motor Boat Show, which opens to-morrow.

The program includes talks and films contributing to the fund of information on marine engine testing, designing and performance. The meeting promises to prove particularly interesting in view of the fact that a great deal of information along this line has become available with the capture of heavy oil engines of German design.

The effect, if any, which aircraft engine design and practice have had on speed-boat marine engine design is also the subject of much thought just now, and these and many other timely thoughts will be brought out at the motor boat meeting. The meeting will provide the opportunity for members to discuss interesting data on motor boats and their power equipment, and a large attendance is expected.

The S. A. E. standards, many of which were developed during the war in connection with the quantity production of submarine patrol boats and chasers, will be shown at the Motor Boat Show in Grand Central Palace.

The aeronautical meeting, Wednesday afternoon, March 10, which also will be held in the Engineering Societies Building, promises to be an interesting session.

A widespread interest in military and commercial aeronautics exists, and an extensive program has been arranged for this meeting, which will afford opportunity for the discussion of the technical problems necessarily involved. Vice-President Glenn L. Martin will preside at the technical session.

The discussion will be opened at 2 p. m. by Colonel V. E. Clark, with a paper entitled: "Possible Airplane Performance with Maintenance of Engine Power at All Altitudes." The paper contains interesting data by which possible speeds may be rapidly calculated by use of curves previously developed from the craft characteristics.

### Discuss Braking Methods

Equally interesting to engineers interested in civil aeronautics is the paper of Alexander Klemin, "Consideration of Landing, Run and Getaway by Standard Type Airplanes." In this paper the possible methods of braking an airplane in landing are outlined and indicated. Another paper by S. R. Parsons is entitled: "Some Factors in the Design of Airplane Radiators," containing the results of experiments and tests made at the Bureau of Standards on air flow through radiator tubes.

Other papers to be presented are: "The Heat Treating of Brazed Fittings for

Aircraft," by Archibald Black, engineer, in charge of aeronautical specifications, Bureau of Construction and Repair, Navy Department, Washington, and "Flying an Aviation Engine on the Ground," by S. W. Sparrow, which gives the data obtained from experiment and tests made at the Bureau of Standards with engines under altitude conditions in the laboratories at the bureau.

A brief report from the committee on aeronautics will be submitted by Chairman M. H. Crane.

The Aeronautical Dinner and Reception will be held at the Hotel Astor at 6:30 on the same evening.

## Standards Committee Arranges Meetings

NEW YORK, Feb. 19—The Standards Committee of the Society of Automotive Industries is preparing to issue a schedule of Standards Committee meetings in various sections for 1920. Although the program is not yet complete announcements of a few of the more recent sessions have been made.

An interesting meeting is expected at Washington, Feb. 25, at the Bureau of Standards, in which the equipment subdivision on storage batteries will join with the A. I. E. E. sub-committee on automotive storage batteries and the Automotive Electrical Association joint committee, together with representatives of the Army and Navy and the Motor Transport Corps, in the discussion of specifications for motor truck storage batteries and other subjects.

Other standards committee meetings scheduled are: Roller Chain Division, Indianapolis, March 1, Claypole Hotel, and Engine Sub-division on Governor Mountings, Chicago, March 2, at the Hotel Sherman.

## Engineer Wins Suit for Share in Profits

MILWAUKEE, Feb. 16—Peter J. F. Batenberg, now chief engineer of the Mitchell Motors Co., Racine, Wis., and for eight years occupying a similar position with the F W D Auto Co., Clintonville, Wis., was granted a judgment in the sum of approximately \$32,000 against the F W D company in the Federal court at Milwaukee.

The suit involved payment under a contract by which Batenberg was to receive 1 per cent of the profits. Testimony introduced at the hearing indicated that the profits of the F W D company during the years 1915 to 1918 were in excess of \$4,000,000. The defense claimed that profits were materially reduced by State and Federal income taxes, surtaxes and other payments of this nature.

### STEVENS SALES HEAD DIES

CHICOPEE FALLS, Feb. 14—George Twitmeyer, general salesmanager of the Stevens-Duryea Automobile Co., died last week at Los Angeles, Cal., of pneumonia, while on a western business trip.

## Austin Capital to Be Made \$30,000,000

General Motors Rumors Die—Rolls-Royce Pays 10 Per Cent Dividend

LONDON, Jan. 30 (*Special correspondence*)—The Austin Co. will be in the market shortly for \$15,000,000 more capital, making the total called-up capital \$30,000,000. Lengthy reports of the shareholders' meetings in the press do not contain much reference to the rumored proposal of the General Motors, Ltd. (U. S. A.), to acquire a controlling interest in the Austin factory.

The recital at such length of the company's revenues, as is to be found in the press reports of the stockholders' meeting, whets curiosity the more to know when the Austin company will show some beginning of output corresponding to its large resources.

Of another kind is the year's report of the Rolls-Royce company, which shows a dividend at the rate of 10 per cent and provision for allocating 50,000 ordinary shares, worth about \$200,000, among the workpeople as a welfare fund. A dividend at the rate of 15 per cent is likely to be paid next year.

ENGLISHMAN.

## Hanson to Produce New Touring Cars

ATLANTA, GA., Feb. 18—New models of touring cars, sedans and roadsters, with up-to-date features, are being exploited by the Hanson Motor Co. The engine is a Continental 6 cylinder, 3¼ x 4½ in., having a 3 point suspension. A Marvel carburetor is used, in connection with a vacuum feed and hot spot. Storage battery ignition is employed, and a Delco make of starter motor and generator, with ground return wiring.

Other features are a Borg & Beck clutch and a Covert gearset having three speeds forward and reverse. A Timken semi-floating rear axle is used. The foot brake is external and hand brake internal. Tire sizes are 32 x 4. Stock equipment includes demountable rims, windshield and a Stewart speedometer.

### MANUFACTURE NEW TIMER

NEW YORK, Feb. 16—A new timer is being manufactured by the Blublade Motor Specialty Corp. here. I. C. Lewis of New Haven, Conn., is president and Vance Shearer, secretary and treasurer. The firm recently secured headquarters at 49 and 51 West Sixty-sixth Street.

### CLEVELAND EXPANSION

CLEVELAND, Feb. 16—Twice as many Cleveland Light 6 cars were produced during January than during the previous months by the Cleveland Automobile Co. An addition to the factory, 200 x 80 ft. and four stories high, will be completed about March 15. With the completion of this factory addition the company expects soon to reach its plant production of 150 cars daily.



## House Gets Reports on Aviation Record

### Republican Majority Condemns Expenditures — Democratic Minority Offers Defense

WASHINGTON, Feb. 18—Two reports were issued by the House subcommittee investigating aviation expenditures, the one condemning the expenditures and the other approving them. The condemnation was issued by the majority of the committee of three, that is, by the two Republican members. The minority report of approval was issued by the third member of the committee, a Democrat.

Employing the same counsel who acted for the Senate Investigating Committee during the war and admittedly basing its investigations upon the Hughes and Senate reports, the committee denounced the expenditures as a waste, and claims that the War Department spent \$1,015,600,000 for aviation during the war, with the result that only 213 American-made planes of the DeHaviland 4 type reached the front.

The total number of planes with the American forces at the time of the armistice was 740, including 527 bought from the Allies, the report states, is emphasizing that no American-built combat, pursuit or bombing planes ever reached the front, despite the huge expenditure.

The report is about 50,000 words in length and charges Secretary of War Baker, John D. Ryan, Major-General Squier, Col. E. A. Deeds and Colonel Disque, who directed the various branches of aviation work, with responsibility for the failure of the United States to be a factor in the air and for the "wasting of many millions."

The committee strongly recommended the creation of a separate air service.

"During the war," the Lea report says, "America established and maintained more than fifty aviation training schools here and in Europe, in which thousands of young men were trained. We produced 11,760 airplanes and when the war closed were making them at the rate of 23,000 a year. We purchased 6745 planes and 5071 engines from the Allies, of which 2300 were service planes used by American forces in Europe."

#### Made Air Dominance Possible

"On the day of the armistice," states the minority report, "we had 1620 service planes available for use on the front lines. We furnished the materials and supplies that made possible the maintenance of the Allied air forces and finally resulted in their predominance by nearly 100 per cent on the Western front. In machines which we owned, our fliers went to the front and established part of the most brilliant record of the war."

"Looking at the situation from the subsequent experience of ourselves and our Allies, there was never the practical possibility of fulfilling the program adopted in May, 1917. We were absolutely without the engineering experience, the airplane and aeronautical mechanics and the manufacturing resources to meet such a program within the time specified. The

men who could design and make airplanes and engines in such numbers had yet to acquire their skill. Jigs and dies, the tools, the engines, the planes and the factories in which they were to be made had yet to be designed and accommodated to quantity production.

"Only inexperienced men had promised performance of this program, but their inexperience was not reprehensible; it was the inexperience of their country, where none, perhaps, were of greater skill or experience than those who assisted in planning and recommending the program."

#### Planes at Front No Test

"The majority report unworthily seeks to discredit American production and aircraft effectiveness on the front by dwelling on the claim that only 213 American-made airplanes were on the front on the day of the armistice. The fallacy of the method of criticism is apparent. Two hundred and thirteen planes at the front is no more a test of American production of over 16,000 planes than would be a criticism that we had only 500,000 soldiers at the front, ignoring the fact that we had 1,500,000 behind the lines and 2,000,000 in America."

More than \$50,000,000 was spent, the majority report says, in building 4000 clumsy, dangerous DH-4 observation planes, the design of which underwent 3000 changes. A few of these were shipped to France, where aviators united in denouncing them as fighting ships. Both Secretary Baker and Director Ryan are charged with having had full knowledge of the defects of these machines.

"Another \$6,000,000 was wasted by the War Department in striving to fit a Liberty motor into a type of converted Bristol machine, but the material was later scrapped. Seventeen million dollars additional was tossed away in experiments with training planes, which also were scrapped."

## Denby Truck Elects

### A. S. Moore President

DETROIT, Feb. 18—Stockholders of the Denby Motor Truck Co. at the annual meeting elected A. S. Moore president and general manager; Major Edwin Denby, first vice-president; T. S. Simpson, second vice-president; M. H. O'Brien, secretary; E. R. Ailes, treasurer, and H. T. Carpenter, assistant secretary and treasurer.

E. A. Murphy was made purchasing agent and D. C. Evans production manager. Walter J. Drake, former vice-president, has retired from the Denby organization.

#### Gardner Machine Builds

BELOIT, WIS., Feb. 16—The Gardner Machine Co. of Beloit, Wis., one of the principal manufacturers of disk grinding machines in the country, has let contracts for the erection of a 2-story shop addition, 100 x 300 ft., which will enable it to increase its output from 35 to 40 per cent. L. Waldo Thompson is president.

## Power Shortage Cuts Detroit Production

### With 1920 Program Shattered Increased Prices on March 1 Seem Inevitable

DETROIT, Feb. 18—Another interruption to the already badly handicapped production program in the automobile factories and the promise of an increase in prices on automobiles of all descriptions March 1, with the possibility of another before June 1, were outstanding features of the industry here to-day.

Hope of keeping up the production program faltered when the Detroit Edison Co. announced that industries that were not absolutely essential would be denied power within five days, unless there was relief from the coal shortage.

This announcement comes as a result of the seizure of 26 carloads of coal destined to Detroit Edison Co. by an unnamed railroad. The company has been operating on a much reduced coal supply for three months, and following the seizure word came from Washington that the company's future supply would be shut off until a shortage in the schedule to the Seaboard Air Line had been made good.

Because of this all customers in Detroit except creameries, bakeries, river tunnels, private homes, Michigan Central yards and other absolute essentials will be denied electric current.

Coming as it does when the automobile factories are suffering from lack of freight cars, cutting production and piling up the curtailed outputs in every available storage plant, the situation seems hopeless.

The result of these conditions necessarily must prove a burden to the consumer. Even with improved freight conditions, eliminating expensive drive-aways, the price must go up, the factories say. Prices of all materials entering into the manufacture of the automobile are increasing constantly. Increased production schedules being impossible, thus removing the opportunity to meet the smaller factory profits by greater output, an increase in prices is deemed mandatory.

## Goodyear Tire Sued for Blimp Disaster

MILWAUKEE, Feb. 16—Suit has been filed in the federal court at Milwaukee by the Northwestern National Fire Insurance Co. of Milwaukee and the Home Insurance Co. of New York, to recover damages of \$28,824.05 from the Goodyear Tire & Rubber Co., Akron, Ohio. The suit grows out of the blimp disaster in Chicago on July 26, 1919, and the amount claimed represents the payments made by the insurance companies to Northwestern University of Evanston as owner of the Illinois Trust Co. Building. The action is expected to furnish precedents of the utmost importance in regard to the operation of aircraft over cities.

## New Stevens Plant Nearing Completion

SPRINGFIELD, MASS., Feb. 14—Work is being rushed on the new Stevens-Duryea factories now under construction on the 38-acre plot in Wilimansett, formerly the Hamden County driving park. The plant will be composed of eight units, one of which is ready and two almost complete. There will be 100,000 sq. ft. of working space when the factory is in full operation.

The list of workmen at the old Stevens-Duryea factory in Chicopee Falls is being rapidly augmented. It now includes most of the former department superintendents and foremen. The new factories will call back practically all of the former employees and many additional ones from automobile centers. Modern production methods are planned for the new plant.

## Form Half Million Tire Machinery Company

TOLEDO, O., Feb. 14—A \$500,000 company to manufacture machinery for use in tire plants is being organized and will locate at Port Clinton near here. Ten acres of ground for the site of the plant, adjoining the plant of the Ohio State Rubber Co., will be given to the company, unconditionally by W. O. Bruess, president of the rubber company. Incorporators of the machine company are prominent residents of Toledo and this section.

## Turnbull Name Now Defiance Truck Company

DEFIANCE, O., Feb. 14—The name of the Turnbull Motor Truck & Wagon Co. has been changed to the Defiance Motor Truck Co. Under the Turnbull name the company has been engaged for forty years in truck and wagon manufacture, and since the inception of motor vehicles, in motor truck manufacture.

At the annual meeting the following officers were elected: Charles H. Kettering, president; Charles Behringer, vice-president; R. Carey May, secretary and treasurer; Harry K. Reinhoehl, chief engineer; A. M. Pearson, general sales manager.

## CARBURETER PLANT MOVED

LOS ANGELES, Feb. 12—The Master Carburetor Co., Los Angeles, has moved into the new plant at Main and Thirtieth streets. The new plant provides for the expansion of the business to meet a sales and service program to extend to all of the principal cities in this country and abroad.

## TIRE COMPANY SOLD

NEW YORK, Feb. 14—The American Business Corp. of New York has taken over the Union Tire & Chain Co. of Cheshire, Conn. The offices of the American Corp. have been moved from 516 Fifth Avenue to 1789 Broadway.

## Current News of Factories

### Notes of New Plants— Old Ones Enlarged

## Fuller Company Buys 10 Acre Factory Site

KALAMAZOO, MICH., Feb. 13—Fuller & Sons Mfg. Co., besides extensive additions now nearing completion, has purchased ten acres adjoining the present factory to provide for future expansion demanded by the rapidly increasing business. The strip is 330 ft. wide and extends a quarter of a mile along the lines of the G. R. & I. and the Grand Trunk railways.

A four-story concrete building, 60 by 100 ft., has been started to replace the original home of the company and a steel warehouse, 30 by 100 ft., will replace a temporary wooden building now in use. The company also has installed its own gray iron foundry, which will start operations March 1. A large modern office building is planned on the site just purchased and construction of the building will be started within the year. Still another large unit of the main factory will be erected early in 1921.

Reports submitted at the annual meeting of the company directors in January showed shipments for 1919 to have been nearly double those of 1918, totalling approximately \$2,500,000. F. D. Fuller is president of the company, L. C. Fuller vice-president, W. P. Fuller secretary and sales manager, and W. E. Upjohn treasurer.

## FORM SPECIALTY COMPANY

MILWAUKEE, Feb. 16—The Milwaukee Auto Specialty Mfg. Co. has been incorporated, with a capital stock of \$25,000, by members of the Milwaukee Auto Specialty Co., which has been engaged for many years in the manufacture of automotive equipment. The incorporators are Walter R. Fleischer, William J. Schubert and Walter J. Raley, who have purchased the interests of other shareholders in the concern and will continue the business under a corporate form. Dr. Richard J. Fleischer, who founded the business, will retire, his son, Walter R. Fleischer, taking over his interest.

## MAKE CONTROLLABLE LAMP

CONNEERSVILLE, IND., Feb. 13—The Indiana Lamp Co. of this city will manufacture a new automobile headlamp, known as the Two-Way Lamp, which permits of either throwing the beam of light directly ahead or tilting it downward so as to avoid glare. The lamp will be used as regular equipment on Lexington cars the coming year. An illustration showing the control mechanism was printed in a recent issue of Automotive Industries.

## Incorporate \$300,000 Top Company in Toronto

TORONTO, Feb. 13—An important addition to the fast-growing automotive industry of Canada is the General Top Co. of Canada, Ltd., capitalized at \$300,000, which has been incorporated with R. C. Kilgour, president; L. W. Lee, vice-president and general manager; W. L. Cowan, secretary and treasurer, and H. A. Kent, salesmanager.

Kilgour and Cowan are respectively president and general manager and treasurer of the Ontario Motor Car Co., Ltd., of Toronto, Packard distributors. Lee was for years assistant superintendent of the Ford Motor Co. of Canada, Ltd. The company has taken over the plant of the Curtiss Airplanes, Ltd., Toronto. Here standardized Artcraft tops will be manufactured.

## Spencer-Smith Company to Increase Capacity

HOWELL, MICH., Feb. 17—Spencer-Smith Machine Co. announces contracts for the Chandler Motor Co. of Cleveland, and the Supreme Motors Corp., Warren, Ohio, for 60,000 pistons each. The Spencer-Smith company has started work on a new building to take care of these, and other contracts, and when completed the building will have a production capacity of \$1,200,000 a year.

## FORM DROP FORGE COMPANY

MILWAUKEE, Feb. 17—A new drop forge plant, specializing in automotive parts, will be established in Milwaukee at once to accommodate the rapidly growing needs of the city as a producer of material for passenger and commercial cars, tractors, etc.

The Interstate Drop Forge Co. of Milwaukee has been incorporated, with a capital stock of \$250,000, and will break ground about March 1 for a complete new plant in the center of a big industrial district at the northwest city limits. The plant will be near that of the A. O. Smith Corp. and other large automotive parts factories.

The main forge shop will be 100 x 200 ft., with a machine shop 75 x 100 ft., and is to be ready about May 15. Major S. M. McFedries, 425 East Water Street, late of the ordnance corps, is one of the principals in the new organization.

## TO DISTRIBUTE PROFITS

SOUTH BEND, IND., Feb. 16—The board of directors of the International India Rubber Corp., at their meeting here this week, directed that the entire accumulated dividends of 7 per cent in cash on the preferred stock for the year 1919 and that a cash distribution be made out of earnings equal to 6 per cent on the common stock. The officers elected for the ensuing year were: George W. Odell, president and treasurer; P. E. Studebaker, vice-president, and B. F. Wulff, secretary, with G. W. Truxell and J. W. Ridge additional directors.



## Mason Tire Company Sets \$7,000,000 Sales Goal

KENT, OHIO, Feb. 14—Sales of the Mason Tire & Rubber Co., for its third fiscal year ending Oct. 31, 1919, were \$3,468,858.52, with a net profit of \$223,705.52, representing an increase of about fifty per cent over 1918 business and profits.

Ten additional factory branches were opened in the United States by the company during the year, making eighteen in operation. A sales goal of \$7,000,000 has been set for the present fiscal year.

## Ajax Rubber to Have \$20,000,000 Capital

NEW YORK, Feb. 14—The New York Stock Exchange has received notice of a proposed increase in the capital stock of the Ajax Rubber Co. from \$10,000,000 to \$20,000,000. The increase is made to provide for future developments and expansion in business. There is no intention on the part of the management to issue any of the newly authorized stock at present.

### LAURAINE ELECTS OFFICERS

NEW YORK, Feb. 16—At a meeting of the Lauraine Magneto Co., Long Island City, last week the following directors and officers were elected:

M. Feldine, New York, president; M. G. Leslie, Pittsburgh, first vice-president; Leo Potter, New York, second vice-president; A. C. Leslie, Trenton, N. J., secretary and treasurer; G. J. Atwell, Long Island City; E. H. Swindell, Pittsburgh, and R. W. Turner, New York, directors.

The company lately came into possession of this property valued at \$100,000 in Long Island City. Out of the authorized capital stock of 50,000 shares at \$25 par value the entire first issue of common stock was largely oversubscribed, giving the company ample working capital, the president reported.

### APPLETON CONVERTS TRADE

APPLETON, WIS., Feb. 16—The Appleton Hub & Spoke Co. of Appleton, Wis., owned and operated by John Tracy, has converted the nature of its product mainly to spokes and felloes for the automotive industries, although it will continue to make hubs and spokes for the horse-drawn vehicle trade. The factory was established 56 years ago. Large orders have been booked from passenger car and truck builders for wheel stock. One of these orders calls for eight carloads for immediate delivery. Maple and birch material will represent the largest part of the output, oak not only being less suitable for this purpose, but being extremely scarce as well.

### SALESMANAGER DIES

WABASH, IND., Feb. 14—Frank L. Johnson, sales promotion manager of the Service Motor Truck Co., is dead here after a brief illness.

## Men of the Industry

### Changes in Personnel and Position

L. G. Patterson, factory representative of the Oldsmobile, recently was appointed district salesmanager of the Oshkosh Motor Truck Co. of Oshkosh, Wis.

Henry S. Marlor, factory superintendent of the Lycoming Rubber Co., Williamsport, Pa., has been made factory manager of the Woonsocket Rubber Co., Woonsocket, R. I.

S. R. Humpage has resigned as vice-president and general manager of the Wilt Twist Drill Co. of Canada to take effect March 31.

Robert Bland has joined the Fowler Lamp & Manufacturing Co. as salesmanager.

Horace D. Johnson has been made manager of the sale of motor parts department of the Rich Tool Co., Chicago. William S. Davison has been made the Detroit representative.

F. R. Thomas, for the past five years connected with the engineering department of the Hudson Motor Car Co., has joined the Jordan Motor Car Co. in the capacity of assistant chief engineer.

Dwight T. Hersey, for many years with the Splitdorf Electrical Co., has been made director of sales at the Jenkins Vulcan Spring Co., Richmond, Ind.

### GOODYEAR MANAGERS CHANGE

NEW YORK, Feb. 14—A. W. Ellis has been appointed manager of the automobile tire sales department of the Goodyear Tire & Rubber Co., for the New York district. S. H. Cunningham has been appointed New York branch manager to succeed Ellis, and W. G. Bedford, assistant manager to succeed Cunningham who formerly held that position.

### ROWAN JOINS DIAMOND COMPANY

AKRON, O., Feb. 13—E. P. Rowan, formerly manager of the Chicago district for the Goodrich Tire Co., for fifteen years, has been made salesmanager in charge of the pneumatic tire division of the Diamond Rubber Co., this city.

### J. E. WRIGHT DIES

YORK, PA., Feb. 16—J. E. Wright, veteran automobile and carriage man, died Feb. 8, at his home in York, Pa., after an illness dating back several years. As one of the founders, and for years vice-president and sales manager of the Allen Motor Co., Columbus, O., Wright was well known in automobile circles throughout the country.

## Saylor Leaves London Berth to Join Dunlop

LONDON, Jan. 30 (*Special correspondence*)—Parry D. Saylor has resigned as London representative of the Goodyear Tire & Rubber Co., and returned to the United States, where, it is reported, he will be allied with the Dunlop tire industry. Saylor did splendid work in London for the Goodyear company and left it as the leading imported tire.

He has a genial commanding presence and made many friends in the British motor trade. The Dunlop interests will be the gainer, since he combines American and British trade knowledge and has a first hand acquaintance with the idiosyncracies of both nationalities.

## Portage Rubber Company Elects New Officers

AKRON, O., Feb. 14—M. S. Long, vice-president of the Portage Rubber Co., has been made president, succeeding James Christy, who becomes chairman of the board; J. W. Maguire has been made general manager and W. E. Wilson and H. M. Kerr treasurer and secretary respectively, succeeding W. W. Wildman and L. E. Larson. Ground has been broken at the Portage plant for an addition that will permit of doubling the output, assuring a production of more than 3000 tires a day.

### PLANT HEAD RETIRES

EAU CLAIRE, WIS., Feb. 16—Extensive changes have been effected in the organization of the McDonough Mfg. Co. of Eau Claire, Wis., which several months ago began the manufacture of machine tools, the bulk of the output of which has been contracted for by member factories of the General Motors group located at Flint, Lansing and Detroit. J. A. McLennan, formerly general superintendent of the Philadelphia works of the Link-Belt Co., to-day assumed the general management of the McDonough company. F. McDonough retires as manager but remains a director. He established the concern in 1888, and developed it into one of the four largest manufacturers of sawmill and lumber manufacturing equipment in the world. From now on the machine tool business will be made predominant. The production will include the Sterling tool grinder, Sterling cylinder grinder and the Daniels automatic multiple spindle chucking machine, a non-competitive tool which embraces the capabilities of six automatic screw machines.

### FORM NEW BODY COMPANY

APPLETON, WIS., Feb. 16—The Standard Body Co. has been organized at Appleton, Wis., with a capital stock of \$30,000 to manufacture motor car bodies, truck cabs and platforms, and similar products. The organizers are L. C., E. C., G. H. and R. O. Schmidt. A factory has been taken over and is now being equipped.

# Calendar

## SHOWS

- Feb. 20-27—New York. National Motor Boat Ship and Engine Show. Grand Central Palace.
- Feb. 21-28—San Francisco. Fourth Annual Automobile Show. Exposition Auditorium. Motor Car Dealers' Assn. G. A. Wahlgreen, Manager.
- Feb. 21-28—Louisville, Ky. Twelfth Annual Exhibition. Louisville Automobile Dealers' Assn. First Regiment Armory.
- Feb. 23-27—Reading, Pa. Annual Automobile Show. Reading Automobile Trades Assn., Auditorium. N. S. Jorgenson, Manager.
- Feb. 23-28—Elmira, N. Y. Elmira State Armory. Elmira Automobile Club. H. S. Bryan, Manager.
- Feb. 23-28—Springfield, Ohio. Annual Automobile Show. Springfield Automobile Trades Assn., Memorial Hall. W. E. Stevens.
- Feb. 23-28—Portland, Ore. Truck Show. Armory. Dealers' Motor Car Assn. M. O. Wilkins, Manager.
- Feb. 23-28—Portland, Ore. Car Show. Hippodrome Building. Dealers' Motor Car Assn. M. O. Wilkins, Manager.
- Feb. 23-28—Grand Rapids, Mich. Motor Car Show. Furniture Exposition Building. M. D. Elgin, Manager.
- Mar. 22-27—Duluth, Minn. Automobile Show. Duluth Auto Trades Assn. W. F. Daly, Director.
- Mar. 22-27—Utica, N. Y. Annual Automobile Show. Utica Motor Dealers' Association.
- Feb. 28-March 6—York, Pa. Annual Automobile Show. York County Dealers' Assn., Overland - Harrisburg Garage. R. A. Anderson, Manager.
- Mar. 1-6—Springfield, Mass. Annual Automobile Show. Auditorium. Springfield Automotive Dealers' Assn. Robert H. Clark, Manager.
- Mar. 1-6—St. Joseph, Mo. Annual Automobile Show. St. Joseph Automobile Show Assn. Auditorium. John Albus, Manager.
- Mar. 1-6—Grand Rapids, Mich. Truck Show. Furniture Exposition Bldg. M. D. Elgin, Manager.
- Mar. 1-7—Springfield, Mass. Annual Automobile Show. Springfield Automobile Dealers' Assn. Harry Stacy, Secretary.
- Mar. 1-8—Seattle. State Armory. Motor Car Dealers' Assn. William J. Coyle, Manager.
- Mar. 2-6—Springfield, Ill. Annual Automobile Show. Springfield Auto Dealers' Assn. John Brodhead, Manager.
- March 3-6—Clinton, Ia. Annual Automobile Show. Clinton County Automobile Dealers' Assn., Coliseum. Harry G. Finch, Manager.
- March 6-13—New York, N. Y. Second Annual Aeronautical Exposition, Manufacturers' Aircraft Assn., Inc., 71st Regiment Armory. Walter Hempel, Manager.
- Mar. 6-13—Greenville, S. C. Carolina Automobile Show. Greenville Dealers' Assn. Textile Hall.

Mar. 7-13—Muskegon, Mich. Automobile Show. Muskegon Auto Business Men's Assn. J. C. Fowler, Manager.

Mar. 8-13—Indianapolis, Ind. Annual Automobile Show. Indianapolis Auto Trade Assn. Manufacturers' Bldg. State Fair Grounds. John B. Orman, Manager.

Mar. 10-13—Lebanon, Pa. Annual Motor Show. Automotive Trade Association of Lebanon. James Furniture Store-Bldg. J. Paul Enck, Manager.

Mar. 12-20—Boston, Mass. Annual Automobile Show. Mechanics' Building.

Mar. 15-20—Great Falls, Mont. Automobile Show. Montana Automobile Distributors' Association.

Mar. 20-27—Trenton, N. J. Annual Automobile Show. Armory. Trenton Automobile Dealers' Assn. John L. Brock, Manager.

March 20-27—Pittsburgh. Motor Square Garden. Automotive Association, Inc. John J. Bell, Manager.

Mar. 22-27—Oklahoma City, Okla. Annual Automobile Show. Oklahoma City Motor Car Dealers' Assn. G. W. Woods, Manager.

## FOREIGN SHOWS

Feb. 22-28—Ottawa, Ontario. Motor Show.

Feb. 22-March 6—Birmingham, England. British Industries Fair.

March—London, England. Motor Boat Marine and Stationary Engine Exhibition.

March—Adelaide, Australia. All Australian Exhibition of motor vehicles, airplanes, engines and automotive equipment.

March 1-15—Lyons, France. Automotive Products, Lyons Industrial Fair.

April or May—London, England. Commercial Vehicle Exhibition. Olympia.

April 3-May 4—Buenos Aires. Exposition of U. S. manufacturers.

July—London, England. International Aircraft Exhibition. Olympia. The Society of British Aircraft Constructors.

## CONTESTS

August, 1920—Paris, France. Grand Prix Race. Sporting Commission Automobile Club of France.

June, 1920—Omaha, Neb. Reliability Truck Tour.

## CONVENTIONS

May 9-12—Independent American Petroleum Congress, Congress Hotel, Chicago.

May 13-20, 1920—San Francisco. Seventh National Foreign Trade Convention.

## S. A. E. MEETINGS

Feb. 25—Motor Boat Meeting. S. A. E. Headquarters. New York. (Evening Session.)

Feb. 27—Midwest Section, Chicago.

Mar. 10—Aeronautic Dinner and Meeting. S. A. E. Headquarters, New York.

## Trade Opportunities in Foreign Markets

WASHINGTON, Feb. 16—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received requests for automobiles or parts agencies of business from individuals and companies in foreign countries. These are listed below. For further information address the Bureau of Foreign and Domestic Commerce and specify the Foreign Trade Opportunity number.

An agency on commission is desired by a man in Belgium for the sale of automobiles and accessories and motorcycles. Reference. 31987.

A firm in Brazil through their agent in the United States request the representation of manufacturers of automobiles and rubber tires. References. 31995.

A trading company in the United States having agencies throughout Europe, Latin America, Africa and Australia desires to purchase and secure an agency for automobiles and accessories. References. 32003.

A firm of importing merchants in New Zealand desires to secure an agency for the sale of automobiles and accessories. Reference. 32009.

A brokerage firm in Switzerland desires to purchase and secure general

agencies for the sale of motor cars, trucks and motor boats. Quotations should be given c.i.f. Rotterdam or c.i.f. Hamburg. Payment, cash with order. Correspondence may be in English.

The American purchasing agents of a firm in Southwest Africa desire to receive catalogs and price lists of automobiles to be shipped to that country. References. 32012.

An importer in Belgium desires to purchase an agency and consignment, and eventually purchase bicycles and tires. Correspondence and catalogs should be in French. 32016.

A wine importer in Crete desires to be placed in communication with manufacturers of small tractors not over 10 hp. Correspondence should be in French. Reference. 32021.

A firm in Switzerland desires to purchase and secure an agency for motor cars, trucks, tractors, etc. Quotations should be given f.o.b. American port or c.i.f. European port. Correspondence may be in English. References. 32025.

## FRANK L. JOHNSON DIES

DETROIT, Feb. 13—News of the death of Frank L. Johnson, sales promotion manager of the Service Motor Truck Co. at Wabash, Ind., reached Detroit this week.

## Toledo to Compel Branding of Seconds

TOLEDO, O., Feb. 13—The city council has approved an ordinance compelling dealers in automobile tire seconds to so brand their products, and will impose a severe penalty for violations. The movement was sponsored by the Better Business Association and has the hearty approval of everybody connected with the automotive industry.

## NEW REO UNIT TO OPEN

LANSING, MICH., Feb. 13—Reo Motor Car Co. rapidly is completing a large unit, begun last fall, as an addition to its factory, and expects to be in operation in that portion of the plant soon after March 1. The addition adds 132,000 ft. of floor space. Work of converting what formerly was the truck plant into an exclusive motor-making unit is under way.

## LYONS ADDS DRY KILNS

LANSING, MICH., Feb. 13—Hugh Lyons Co. will add two more dry kilns to its plants to take care of increased production, resulting from the devoting of a large portion of its plant to the manufacture of truck bodies.